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Sculpture at the Royal Academy.

AS with the paintings this year so it is with the sculpture at the Academy; there is nothing that can be called a great work, but there are a good many of high merit and interest; though it can hardly be said that this year, as in several previous years, the sculpture is the finest part of the exhibition.

Sculpture is expression through form and modelling, but one may distinguish two types of sculpture; that which aims simply at the representation of a moment of action or attitude in the figure, without conveying any meaning or sentiment beyond the mere beauty or interest of the figure itself; and that which is intended to convey a thought which could be expressed in words. All other qualities being equal, the latter is no doubt the higher order of work. But after all, it is execution more than any other quality which decides on the pre-eminence of a work in sculpture; not, of course, the mere detailed finish of a costumed figure on which the modern Italian sculptors pride themselves, but that kind of execution which implies the perfect mastery of the pose and balance and of the anatomical construction of the figure, and the perfect sense of what can be expressed in the material, which together go to make the indefinable something which we recognise as "style." And a mere modelled figure with style, though with no special story or *motif* expressed in it, is of more value than a poetic conception which does not rise to the quality of style. Such a work, in fact, makes its own ideal meaning, though such as can be only felt and not defined. As to mere likenesses, and those slighter efforts which may be called *genre* work in sculpture, they of course occupy an entirely inferior plane, though they may be interesting in their way.

We have examples of both of the two principal types of sculpture in works that are in pretty close juxtaposition in the Central Hall. Mr. Bertram Mackennal's group "The Truth-seeker," is a work embodying a special thought. A nude figure of a man, with a face expressive of set and earnest purpose, is just taking a stride in advance partly across the body of a woman reclined on her side, to whom he pays no attention. Evidently the artist has meant to sum up in the momentary action of these two figures the position of the man who quits human love in the search after intellectual truth. It is a fine conception in symbolical sculpture, and expressed with dramatic vigour; but *quâ* sculpture, and in the matter of style, it hardly touches the highest point, and we have seen works by the same artist which, with less of symbolic meaning, were superior in design. On one side of this is to be seen the work of Mr. Oliver Wheatley, whose object in general is obviously to exhibit human pose and action, as he did in his admirable figure of "The Potter" last year. His "Sons of Poseidon" represents two youths swimming, one of them apparently exclaiming at the other for coming into collision with him; parts of their bodies emerge from a roughened surface representing the water; but the difficulty in treating swimmers in sculpture is that to show much of the figures they have to be represented as swimming higher out of the water than would be quite practicable, except by a momentary effort, and consequently the effect is not altogether truthful. This is a spirited attempt at a difficult subject, but we cannot consider it a very successful work. On the other side of Mr. Mackennal's group is Mr. Taubman's "The Butterfly," a statue, with a bronze-green patina, of a nude young girl kneeling and looking at a butterfly perched on her upstretched hand. Nothing could be more simple in idea, but the work as a whole is complete in conception and execution—it has the quality of style, in short, and is one of the best pieces of sculpture of the year.

The most remarkable and complete among the works which embody a poetic idea is Mr. Toft's "Spirit of Contemplation," a design in which thought and style are perfectly combined, and which is unquestionably the most notable piece of sculpture in the Central Hall; but this is a bronze replica of a work previously exhibited in plaster, and which we have before described and commented on. Next to this, one of the most serious works in aim and feeling is Mr. Henry Pegram's large relief entitled "A Monument," in which the idea of a memorial to the dead is treated somewhat after the manner not infrequently adopted by M. Mercié in monumental sculpture; a draped figure of a mourning woman is shown in relief on a slab designed in a certain architectural fashion, the upper portion of which is occupied by a medallion portrait of the subject of the monument. This is a fine and pathetic work, and the architectural portion is well designed; but while the subject reminds one of the eminent French sculptor one cannot help feeling how far it falls short of Mercié in the quality of style; both the mourning figure and the portrait seem somehow too *prononcé*; there is something hard and matter-of-fact about their design and execution which is at variance with the poetic ideal aimed at; it is difficult to say why, but those who are familiar with the best French sculpture of the day will feel the difference between this and a similar subject as it would be found treated in the Salon; the difference, perhaps, between the genius of the English and the French mind.

Among the other works in the Central Hall a prominent one is Mr. Gilbert Bayes's "The Fountain of the Zodiac Belt," not a very intelligible title; the design consists of a nude female figure, of rather prosaic realism and not very beautiful, who holds a long and wide belt which assists the composition, and drops in a vertical line before her a cord supporting some kind of bag or net, we know not what, at the end of it, which seems to form the issue for the water; semi-circular seats are scooped from each side of the pedestal, and two projecting corbels in front of the pedestal, supporting nothing, are themselves supported each by a small group of four horses, arranged quadriga-fashion, which are quite out of scale

with all the rest of the design and seem to have no kind of relation to it. This is a clever and original work, and has plenty of character but no style whatever; it is, in fact, eccentric, and eccentricity is a dangerous quality in sculpture. Mr. Bertram Pegram's "Prayer" is a small work of much charm, a face in relief surrounded by cherubs' heads. In "Pegasus" Mr. Gilbert Bayes shows a horse's head conventionally treated after the Parthenon model, with portions of the wings proper to Pegasus shrouding it on each side; a good bit of work of its class. Miss Pownall's "The Harpy Celæno" has vigour and power of modelling, though it is a revolting subject for sculpture. In "Paradise Lost," a marble bas-relief, Mr. Arthur Walker shows a powerful conception of Satan at the ear of Eve—powerful at least in the malicious expression of the tempter, for the face of Eve is rather weak. Mr. Lucchesi's statuette illustrating a woman of Carthage stringing a bow with her long hair cut off for the purpose is one of those pretty and correct works (of which there are other examples in the Academy) against which there is nothing to be said except that they leave one totally indifferent. Mr. Reynolds-Stephens's pedestal group, "Love's Crown," placed in the centre of the hall, does not rise higher than *genre* sculpture, but is very good as such; the "crown of love" is the infant, and the difference of expression in the heads of the father and the mother, with the touch of tenderness in the countenance of the latter, is happily imagined and true to nature. It is a small-scale work in bronze and other metals, with a decoratively-treated pedestal.

Of the works which hold the middle of the floor in the Lecture Room the best and most interesting is Mr. Colton's marble group, "The Springtide of Life," which has already been exhibited in plaster; one of the works which represents a moment of life and action, in this case of two children, reproduced for its own sake. This has as decisively the quality of style as Mr. Taubman's "Butterfly," and is one of the most completely satisfactory works of the year. Miss Maryon's group of two children, under the title "Listen," is a pretty work of the same class, though by no means equal in style to the last-named. Mr. Brock's "Contemplation" is a beautiful and expressive female head crowned with masses of hair; we hope the wooden pedestal is only temporary; some richer and more durable material would be more in keeping. Mr. Leslie's large figure, "The Birth of Aphrodite," hardly succeeds in giving new interest to a very old subject. Mr. Armstead's fine and dramatically expressive half-size figure, "Remorse," is another replica of a work previously exhibited in plaster. Mr. Herkomer's "Phantasy in Copper and Enamel" is—a phantasy, and not a very happy one.

Among the works placed round the walls, Mr. Frampton's bust of Chaucer, to be placed in the Guildhall, is a fine powerful work, but as a conception of Chaucer seems rather too grave and serious; to be sure, it appears intended to represent the poet in middle life, and Chaucer can be serious and even tragic enough at times, but there is no expression of the naïveté and light-hearted interest in life which is, after all, the central impression derived from Chaucer's poetry as it has come down to us. Among other busts Mr. Hartwell's "Study of a Head" is very beautiful; Mr. Bertram Pegram's bronze bust entitled "Girlhood" is noteworthy for expression and character; and Mr. Brock's two portrait busts of the late Mr. Cecil Rhodes and of Mr. Chichgur are masterpieces of marble-cutting—that is the right term to use, for they are not finished up, they are boldly-carved portraits with the marks of the chisel obvious upon them; the characteristic and vigorous work of a sculptor who is master of his craft. Among works of the more imaginative class is Mr. Frampton's bas-relief in bronze, "Part of a Memorial to a Hero," a piece of work which ought to be judged perhaps in relation to the whole of which it is said to form a part; as it is, its meaning seems rather mystic and uncertain. Miss E. M. Rope exhibits two wooden carved panels for the front of an organ chamber—children playing on instruments and singing; they are very well treated for their position, carved in very low relief so as not to depart from the subordinate character proper to a panel. In this respect it may be doubted whether Mr. Simonds's four "Panels from Drawing-room doors at Bradfield House" are not in too high relief for the position of a panel in a door, though this depends of course on the architectural treatment of the door and its framework; they are dancing figures poised in the middle of the panels, and may be taken to represent the Four Seasons, though this is not so stated. Mr. Anning Bell's painted bas-relief of an angel for a reredos in Park Church, Glasgow, is a kind of decorative work which must be regarded in its relation to the effect of the whole reredos (not illustrated); taken by itself it is rather pointless. Among other things not to be passed over are Mr. Frampton's bronze bust of Mr. Strang; Mr. Harold Parker's pretty miniature bust of a child's head; Mr. Nicholson Babb's two little children "In Slumber-land"—a bronze miniature; Mr. J. Crossland Maclure's little statuette of "Andromeda," a draped Andromeda, remarkable for graceful and expressive lines of the figure; Miss Ruby Levick's "Sledge-hammerers," a bas-relief of artisan labour; Mr. Henry Pegram's memorial bas-relief to Sir John Stainer; Miss Florence Steel's design for a chain (we should rather say necklace) for the Mayoress of Preston, an excellent bit of decorative metal-work; and Miss Dorothy Rope's little silver bas-relief, "Summer is y Cumin In." A work which perhaps hardly comes properly under the domain of sculpture, though there is nowhere but the sculpture-room to put it in, is Mr. Reynolds-Stephens's "Part of a church screen, in metal mother-o'-pearl, marble &c." This is an effective design, consisting of brass stems of fine curvature of outline which branch out above into a thick metal foliage of somewhat too realistic character. It is clever work, but there is too much of "l'art nouveau" about it; it is without the reticence and purity of line which belong to the best style of design in metal work. This kind of design may for the present be attractive for its novelty, but it is a false style of art, or rather it is a want of style, and will not retain its place when the present fashion has passed away.

We shall give some illustrations of the sculpture at the Academy in another issue; for the present our illustration pages are filled, but we did not wish longer to defer notice of the sculpture at the Academy.

SOME UNSOLVED PROBLEMS IN ENGINEERING.

IN the first lecture of the "James Forrest" series, delivered in 1892 by the late Sir William Anderson, the subject chosen was "The Interdependence of Abstract Science and Engineering." At the present time, the Council of the Institution of Civil Engineers, by whom the lectureship is administered, felt that new ground might advantageously be opened, and, in connexion with the lecture delivered by Mr. W. H. Maw on Tuesday last, the desire was expressed that the historical aspect should be left alone, and that the lecture should be devoted to the indication of some directions in which the further aid of the physicist would be of immediate service to the practical engineer. As Mr. Maw told his audience, the suggestion was made that his lecture should be entitled "Unsolved Problems in Engineering"—a very wide subject indeed—and the lecturer wisely adopted the more modest title which is indicated above. The lecturer made further exercise of a wise discretion by regarding the term "problems in engineering" in a restricted sense, leaving alone far-reaching composite problems which are dependent for successful solution upon several more or less fundamental factors that are also problems awaiting solution. The lecture with which we are now concerned dealt entirely with a limited number of these subsidiary but important problems.

In what we may term the first part, the question of power was considered in various aspects. After some general remarks upon the importance of the economical generation and distribution of power, and an explanation of the important difference between economy as understood by the physicist and by the steam-user, Mr. Maw proceeded to direct attention to some points awaiting final settlement in connexion with the steam-engine. Wasteful though the steam-engine must necessarily be, even in its most improved forms, it still compares favourably with other sources of mechanical power, and the lecturer was well advised in according prominent place to this motor. The general question propounded for consideration was how further progress could be secured. Even upon a detail so apparently simple as the steam-jacketed cylinder, Mr. Maw showed that there is great variation in actual practice, and a lack of knowledge of that exact and definite nature which alone is of real scientific value. Therefore he asked for much more thorough and systematic investigation than has hitherto been accorded to this particular department of work. Another problem relating to steam-engine economy mentioned as still remaining unsolved was the precise economic effect of interheaters, and here again Mr. Maw found available data to be far from satisfying, besides presenting discrepancies that required clearing up. Superheating is a somewhat kindred subject which has received attention within recent times, after having been tried and discarded in the early years of the steam-engine for reasons that no longer exist. The lecturer echoed a generally entertained sentiment in saying that we really wanted accurate information as to the extent to which the most advanced steam-engine practice could be improved by the application of superheated steam. The hint was also given that the advisability of

still higher pressures than are now used might usefully be investigated, and attention was drawn to the fact, overlooked by many engineers and others, that we are still without any direct determination of the physical properties of steam exceeding 350 lbs. per square inch. Altogether, the lecturer thought that the steam-engine still afforded ample field for experimental research of a kind differing widely from ordinary "engine trials," and carried out by collaboration between skilled experimentalists on one hand, and men specially qualified to analyse and to weigh evidence on the other.

Much said by Mr. Maw about the steam-engine applies equally to the internal-combustion motor, but he proceeded to emphasise the desirability of further research in this direction. We have already alluded in our columns to the work of the Gas-engine Research Committee appointed by the Institution of Mechanical Engineers, and although the two Reports issued by that body are of great value, Mr. Maw was perfectly justified in the remark that they have done little more than to touch the fringe of the subject and to afford an idea of the difficulties to be surmounted in carrying out investigations of that character. With the remark that internal-combustion engines alone afforded a crop of unsolved problems sufficient to occupy a large staff of investigators for several years, the lecturer turned to construction, a department of engineering in which our readers are directly interested. In his preliminary remarks he said that, in determining the ultimate strength of a structure we had to consider the maximum forces which may be brought to bear upon it, the stresses induced by these forces in the various elements of the structure, the physical qualities of the constructive materials used, and the extent to which these qualities may be affected by errors of treatment or defects of workmanship. The remark was added that if all these items were known with strict accuracy, it would then follow that an absolutely reliable structure could be built without any excess material whatever. Such conditions were recognised by the lecturer as unattainable in actual practice, but we may remark that even assuming them to be secured, it would not be right to build even a theoretically "reliable structure" without excess material, because it is by no means infrequent for the original load, or duty, of a structure to be increased in the course of its life. Subject to this correction, however, we have no fault to find with the suggestion that "factors of safety" might be more properly named "factors of ignorance." The lecturer then passed on to consider in general terms the effects of wind-pressure, and, among other points, he raised the interesting question as to the action of wind on the lee side of roofs—a matter on which the experiments of Irminger were said to have thrown much light, but which still requires further investigation. Turning next to the theory of the plate-web girder, Mr. Maw alluded to the well-known fact that much information was still wanting, and he mentioned the fact that, although Sir Benjamin Baker called attention twenty-five years ago to the fallacies involved in the accepted ideas as to the stresses on rivets in plate-girder flanges, these ideas and formulas founded upon them still found a place in our text-books, with many other things that would have been abolished long ago if experimental research had been undertaken on a really practical scale. The latter is a very important point, and it would be distinctly interesting if some one with the necessary qualifications could be persuaded to write a paper on the many inaccuracies in such guides to knowledge, as well as in the pocket and note books so largely used in every engineer's office. The remaining part of the lecture was chiefly devoted to the physical properties of steel used for constructive purposes and in tool-making.

The matters discussed in connexion with steel of the former kind related to repetitions of stress, oil tempering, annealing, the elastic limit, elastic fatigue, microscopical examination, the decay of metals, thermal treatment, and several points of direct interest to the steel-maker. Upon all these the lecturer asked for further investigation, and in speaking of alloys of iron with other elements, he gave some interesting notes upon the series of remarkable alloys, which, under the name of "Invar," are now being largely used in France for the manufacture of standard gauges, pendulums, and similar objects. The striking feature of these alloys—containing about 33 per cent. to 36 per cent. of nickel—was stated to be their exceedingly small change of volume under variations of temperature, their linear expansion and contraction under the influence of heat being only about one-tenth that of platinum, the alloys being thus practically insensible so far as atmospheric changes were concerned. The result attained was said by Mr. Maw to be due, not merely to the proportions of the constituent metals, but also to the special treatment to which the alloys were subjected. This point is most significant, and leads directly to the thought that the most important results are likely to follow future investigation as to various alloys of iron. In dealing with tool-steels, Mr. Maw directed special attention to the rapid tool-steels, such as the Taylor-White steel and its successors, materials which have brought us face to face with an apparently abnormal state of affairs, again indicating how extremely limited is the knowledge at present available as to the materials in common use.

Having dealt with the subjects to which reference has now been briefly made, Mr. Maw expressed the difficulty he felt, within the time at his disposal, of doing anything like justice even to the modified title chosen for his lecture; and, in conclusion, he referred to the growth of electrical engineering—in which engineers and physicists have worked together hand in hand—as constituting a great object-lesson, sufficient in itself to abundantly emphasise the fact that the progress of engineering was indissolubly bound up with the progress of physical research.

GREEK ART AT THE BURLINGTON FINE ARTS CLUB.

THE loan collection of objects of Greek art which a Special Committee of the Burlington Fine Arts Club has got together must rank as one of the very best exhibitions which the club has ever opened. The large and interesting collection of coins demands special study and attention, as do the two cases devoted to gems of the Greek and Græco-Roman periods. And although we miss some of the famous gems in the possession of Mr. Alfred Higgins, the distinguished collector and member of the Club, there are a great many exquisite examples of the art of gem engraving.

The first survey of the gallery and its contents leaves one with the impression that there is almost too much in the room; certainly more than enough to hinder quiet appreciation of the finest exhibits. The larger objects ranged round the room are for the most part busts and small "torsi." In viewing the latter, one becomes conscious of a distinct feeling of disappointment. They are not so good as many beautiful Greek torsi in provincial museums which are little known, and which, both for the beauty of their motives and the dexterity shown in the workmanship, should have found places in an exhibition of this kind; and it cannot be urged that the Club makes no appeal to museums, for we observe that the South Kensington Museum figures in the list of exhibitors.

Of the larger objects, great interest attaches to the fragment of the Parthenon frieze (No. 18), which is placed over the fireplace in the Club gallery. There is not much of it, but what there is repays study. It has been carefully described by Dr. A. S. Murray in the Royal Institute of British Architects' "Journal," 1902, No. 2.

Of the busts, a certain marble head of a girl (43) at once attracts attention, not only by the delicate refinement in the modelling, but by the extraordinary canopy which has been erected above it, presumably with a view to controlling the light. Concerning this head the cataloguer is discreetly silent, remarking that a new attribution by Mr. Marshall, of Lewes, is to be looked for. One cannot, by the way, sympathise with the comparison of the workmanship to that of the Renaissance. We should not, however, be surprised to learn that it is not Greek work at all.

Lord Lansdowne lends a very magnificent bust of an athlete (No. 40), an antique copy of an original of the fourth century B.C., mended skilfully in later times. Humanly speaking, the face is one of the most attractive in the room, and, especially in its profile, quite unlike any other example of Greek sculpture. It was found in the villa of that extraordinary lover of Greek life and thought, the Emperor Hadrian.

It is sometimes said that the Greek could not, and would not, utilise baby form as a basis of design. We claim that the much-abused child on the arm of the Praxitelean Hermes, which now finds shelter (Zeus be praised!) in Olympia, is a real baby with all the charm of infantile humanity in its little body; and it is delightful to note in the gallery at Savile-row so many examples of the Greek appreciation and use of child life. The winged Eros (No. 30) holding a socket of a torch in its left hand is, perhaps, the most delightful example which has ever been shown in London. It dates from the end of the second or the beginning of the first century B.C., and is very sympathetically described in the catalogue. Mr. Pierpont Morgan is the fortunate possessor of this and another baby statuette (Case A, No. 6), which we do not quote as an example of similar treatment or skill, but merely in the course of thought concerning the Greek artist and child life. Nos. 16 and 17 in the same case are further illustrations to the point.

In this case, too, is a bronze Aphrodite (No. 9), which is, perhaps, one of the best examples of archaic work in the room. One must not lose, in this little group, exhibit No. 28, which is a peculiarly beautiful example of the tall bronze lamp-bearer, called by the Greeks λυχνοῦχος, but often loosely classed as a candelabrum. This particular example is of the fourth century, and of the pattern known as Etruscan. The poet Pherecrates makes mention of the style. The whole design is not only admirable in its workmanship, but is artistically full of vigour, and tinged with the humour of a mediæval bestiary.

In Case B there are many beautiful things. One remembers two perfect little bronzes in the possession of Mr. C. Newton Robinson, No. 56, a youth poised with the easy grace beloved of the Greek artist, and No. 55, a little child. This is mistakenly described as an "Eros" because of the little knot in the hair over the forehead, an obvious baby decoration common to many nations, for which reason, naturally enough, it makes its appearance on the heads of baby Cupids. This is to state the argument the right way round. In this same case the exhibit No. 37, lent by Mr. E. P. Warren, is of peculiar interest. It is a delightful piece of simple modelling, described as "of the later archaic period." It is a little difficult to understand why the cataloguer calls it "The Diver." It would be more reasonable to regard the curious position of the hands as an example of χειρονομία, the movement of tne hands peculiar to certain dances, especially pantomimic performances.

In Case C is arranged another delightful group of small bronze figures. Very attractive is the freedom in the treatment of the figure No. 80, lent by Sir T. D. Gibson Carmichael. It looks as if it had formed part of some other object of art. The bronze vase handle (No. 82) in this case is really an astonishingly graceful piece of work, and deserves a better position in the group. It is in form the figure of a mænad, the feet together, the elbows close into the waist, the fore-arms extended, and the whole figure bending forward with faultless grace. The modelling is very simple and restrained, and the mass of the shoulders is dexterously broken up by the lines of the *nebris*. It was formerly in the Forman collection. The transition from this to the shaggy head of a centaur (No. 71) in the same case is extreme, yet it does no more than forcibly remind us of the extraordinary catholicity of Greek culture and craftsmanship. It is of the school of Pergamon, and is in the possession of Mr. E. P. Warren.

Case D marks an attractive spot in the room. In it may be seen a beautiful piece of Greek silversmith work of the first century B.C. It was exhibited at the Burlington Fine Arts Club's silver exhibition in 1902. Near it stands a bronze Kantharos (No. 112), faultless in its form and in the springing of its handles. More than one visitor has been heard to remark that it should be copied in modern silver. No one can pass the fluted handle of a vase No. 107. It is one of the most beautiful specimens of craftsmanship in the room; and it would be well to dwell at this moment upon the extraordinarily interesting bronze crater No. 46, one of the best exhibits in the Club. It stands in the middle of the right-hand wall as the visitor enters. The shape of this vessel, which is of the first half of the fifth century B.C., was frequently copied in earthenware, but is rare in metal. The enrichment of the mouldings, the bands of delicate low-relief ornament, and the design of the handles leave nothing to be desired. The vessel will be familiar to many connoisseurs, inasmuch as it was lent for many years to the South Kensington Museum.

The exhibition contains a good number of very carefully collected terra-cotta statuettes. It is but a short time ago that this branch of Greek art was very much neglected by the average man interested in antiquities, and, indeed, at the present moment there is really no good book in our language dealing with the subject. Now, however, that the first enthusiasm has worn off, it is very generally remembered and recognised that these little figures were made in great numbers, and many of them of surprisingly disagreeable proportions. In many cases figures, interesting in the treatment of the drapery or in the elegance of the colour scheme, which is still possible to realise after centuries of interment, are so inordinately long in the body, or so clumsily executed in other respects, that one experiences little pleasure in viewing them. The really good terra-cotta figures, however, rank as some of the best examples of Greek art. Cases E and F in the present collection of such figures contain some very perfect examples of the Tanagra period, notably in E No. 2, No. 11, and No. 37; in Case F No. 64 and No. 82, the latter, lent by Mr. Alfred Higgins, has an additional interest when we remember that there is an identical figure in the Louvre collection.

There are a great number of very fine vases and dishes, indeed so many that it is very difficult to pick out the most pleasing. Several beautiful and very interesting pieces hail from Castle Ashby, and one, in Case G (No. 24) from the Royal Museum at Canterbury. In the latter example it is perhaps the drawing in red on a black ground of a youth with high-strapped *endromides* which charms one; it is beautifully drawn and disposed on the side of the vase, and there is a delightful negligence in the soft hat hanging over the neck.

The studies of Greek life which these figure compositions on Greek pottery yield us are endless and of enthralling interest.

In Case I (76 and 77) are two fine examples of simple glazed earthenware. No one is likely to miss the two-handled vase in blue glass with prismatic iridescence which stands on the right of Case N, or the lovely little cameo relief, in white opaque glass on a purple transparent ground, of helmeted Athena, No. 4, in the same case.

The gems and coins would require an article to themselves, but without them there is enough in the exhibition to help us towards what Gœthe called "Gewahrwerden der griechischen Kunst"—the *finding* of Greek art.

NOTES.

Mr. Aston Webb, R.A. WE are very glad to learn that Mr. Aston Webb was on Wednesday promoted from the position of an Associate to that of a full member of the Royal Academy. On this we may also congratulate the Royal Academy, because their selection of an architect seems to show that they have recognised the fact that architecture is in rather a weak condition in their body at present, and that some more energetic representatives of the art are needed (for the position of A.R.A. is a merely complimentary one), and their selection of Mr. Aston Webb in particular may, we hope, be taken to indicate that the painters and sculptors are beginning to understand that architecture means the power of planning a great building, as well as that of introducing æsthetic detail.

The Exportation of Works of Art from Italy. THERE is no doubt that we may expect a larger amount of exportation of works of art from Italy from the present time. Last year a law was passed by the Italian Government which comes into operation during the present month. Under the old law, antiquities and objects of art were not allowed to be exported if they were what we should call in this country heirlooms. Under the present law, however, it seems that articles belonging to ecclesiastical or other public collections are alone inalienable. There still exists, however, a heavy export duty, though this has now been improved since it is to be the same all over Italy. Objects of art under five thousand lires in value will be liable to a duty of 5 per cent., which rises on a sliding scale according to the value of the article until it reaches a maximum of 20 per cent. It is not likely, however, that this duty will prevent the exportation of pictures of statuary from Italy. It is only rich private individuals or public institutions who are likely to purchase works of art from Italy, and this additional duty will of course be part of the purchase price and be paid by the buyer. As, however, the value of the article is to be fixed by Government officials, we fear that there will be many openings for inducing valuations which are not correct.

London Education Bill. IT is not at all improbable that the Cabinet differences will materially affect the fate of the London Education Bill. It is true that it has now passed through Committee, but there are several opportunities still open for discussion. It has to be borne in mind that the Bill in its present form is unwelcome to every one. The idea with which it started—of giving the Borough Councils a large share in the education of London—has now come to an end, so that, in a word, all that the Bill does is to transfer the duties of the London School Board to the County Council. Nothing can be clearer than that such a change would be no benefit to the education of London. We do not say that it will make it worse, but certainly it will not make it better; in these circumstances there is no little possibility that the Bill may be dropped altogether, the only reason for its continuance would be to assist the Voluntary Schools. But the dissension in the country arising out of the Education Act of last year is becoming so accentuated that the Government may prefer not to enlarge the scene of combat by adding London to the Nonconformist battle-ground.

Repairing Old Houses. THE case of Wright *v.* Lawson, although it lays down no new principle of law, is worthy of one word of comment because it is a decision of the Court of Appeal upon a question of ever recurring importance between landlord and tenant. The defendant was lessor of

certain premises in King's-road, Fulham, which, by his lease, he was compelled to "substantially and effectually repair, uphold, and maintain." The County Council, under the London Building Acts, served the defendant with a notice that a bay window was in a dangerous condition and requiring him to take it down or make it good. Owing to the age and structure of the house it was impossible to restore the window to its former condition, and the defendant therefore set back the window into the main wall. The plaintiff now sued him to replace the bay window, but the Court have held that the defect arose from the inherent condition of the structure, and that the defendant was not liable under the covenant. The only way in which this window could have been reconstructed would have been by supporting it on pillars or some other support which would have created a new structure, an obligation quite outside that imposed upon the lessee by such a covenant.

Powers of Rural Authorities.

IT is not often that such summary justice is meted out to local authorities who exceed their powers, as that recorded in the recent case of Consett Urban District Council *v.* Crawford (19 L. T. Rep. 508). A notice had been served on the respondent calling upon him to abate a nuisance on his premises on July 16, 1902. On July 24, seven members of the Council, with two of the officers and the County Medical Officer of Health, making a round of inspection, came to the respondent's premises, and entered a yard, two of the councillors, however, remaining outside. The respondent came up to the two councillors who were standing outside, and on hearing that the rest of the party were inside he placed a padlock on the door and locked it. The Council sought redress by laying an information against the respondent under Section 306 of the Public Health Act, 1875, for having wilfully obstructed them in the execution of the Act; but this consolation was denied them, as the Divisional Court decided that, as they had not complied with Section 102 of the Act they were only trespassers. It is somewhat curious that Section 102 does not in terms apply to the facts of this case, as it only contemplates cases where either permission has been given to enter, or where permission has been refused, and not to where permission has not been asked. The Court have now laid it down that permission must either be obtained from the occupier of the premises, or, after having been refused, obtained by order from the magistrates; and it is to be noted that if this latter course has to be resorted to, the magistrate has a discretion in determining, not whether a nuisance exists, but whether necessity has been shown for inspection—*see* Wimbledon Urban District Council *v.* Hastings.

Landlords and Trade Fixtures.

THE recent case of "Lambourn *v.* McLellan" decided an interesting point between landlord and tenant as to trade fixtures. The defendant was the trustee in bankruptcy of the lessee of certain premises taken on lease by him as a "boot and shoe manufactory." The lease contained a covenant that the premises at the determination of the term should be given up, together with certain fixtures (not machinery or trade fixtures), and continued—"and all other erections, buildings, improvements, fixtures, and all things which now are or which at any time during the said term hereby granted shall be fixed, fastened, or belong to the said premises." The lessee had brought upon the premises certain machinery, admittedly trade fixtures, which were fastened to the floor and walls by screws. Under the above covenant the lessor claimed the trade fixtures, which except for the terms of the lease would certainly have been the lessee's property. The Court of Appeal decided against the claim, on the ground that where in a lease general words follow particular words, the general words must be limited in their application to things of the same *genus*. In this lease the particular words only embraced landlord's fixtures, and therefore did not extend to defeat the right of the tenant to his trade fixtures.

Railway Companies and Station Approaches.

IN the recent case of Urban District Council of Stretford *v.* Manchester South Junction Altrincham Railway Co., in which a railway company had been sued under Section 150 of the Public Health Act, 1875, by the Urban Council for expenses incurred in making up a road on a piece of land belonging to the railway, and which the railway company had made as an approach to their station, two deeds were put in evidence to show that the railway company had acquired the land, intending to make it a street or road, and, moreover, had sold some superfluous land, covenanting to leave this road as a public street or road. The railway company, amongst other defences, contended that such covenants in the deeds were *ultra vires* and outside their statutory powers, as they could not dedicate a road to the public. Lord Justice Vaughan Williams, in the Court of Appeal, whilst deciding against the railway company on other grounds, intimated a strong opinion that, even if this defence were substantiated, it would not interfere with the application of the section to the road in question. It would certainly appear a strange anomaly if the effect of *ultra vires* conduct on the part of the company could relieve them from such a liability and place it on the ratepayers.

Vibration on Tube Railways.

THE last of the electric locomotives on the Central London Railway will shortly be withdrawn and every train will be made up of two motor and five ordinary cars. It will be remembered that the Committee appointed about two years ago to investigate the alleged nuisance due to vibration caused by the trains arrived at very definite conclusions. They reported that the vibrations were very much greater in some houses than in others, and that different rooms in the same house were not similarly affected by the same train. It seemed also to be a matter of chance whether a given train caused a slight or a severe vibration. An analysis, however, of the results obtained by a vibration recorder proved that the locomotive was mainly responsible for the vibrations which set up such excessive resonance effects. Each axle of the old locomotives supported a weight of about eight tons unrelieved by springs. The load in the new cars which is not spring-borne is less than two tons. The weight of the old seven-car train with gearless locomotive was about 138 tons, including its full complement of 336 passengers. The new trains weigh about 113 tons, but seat twelve fewer passengers. The motor cars are simply ordinary cars modified, so that a truck carrying two motors of 100-horse-power each can be fitted at one end. The combined pull of the motors when the train is running at fifteen miles an hour is nearly equal to a weight of three tons. With the new trains the vibrations are practically non-existent. Lord Rayleigh and the other members of the committee are to be congratulated, not only for finding out the exact cause of the vibrations, but for describing the method by which this difficulty could be overcome.

Motor Racing on the Roads.

THE following is an epitome of a statement published by the Automobile Club Journal of the treatment of the roads with a view to securing safety during the Gordon-Bennett motor race: Certain bends are to be straightened, right-angle turns to be rounded off, the hedges to be cut down for 200 yards on the approach side of each corner. The road is said to be closed at 6 a.m., and all the cross-roads blocked; the public are to be excluded from the road, and 2,000 constabulary to be employed. It would be interesting if the Club Journal had appended some account of the Acts of Parliament which confer such powers on either the Local Government Board or the County Councils, and had stated on whom the expenses were to fall, and whether the ratepayers, arbitrarily excluded from the highways, have not to bear some portion of the costs of converting the highway into a racecourse. It is some consolation to know that the statutes governing highways in England do not appear to admit of any of these proceedings; as it is in the country districts where the roads are maintained at considerable expense, the ratepayers are in an aggrieved attitude at the selfish indifference of the motor drivers to any consideration of the general public, and great dissatisfaction is felt at the Government's announcement that the promised Bill is, after all, not to be introduced this Session. In this connexion we would observe that it is generally assumed a motor car should be allowed to travel at any rate of speed on straight roads, but the question of the cross roads, which invariably intersect these main roads at short distances apart, and at right angles, is entirely lost sight of.

Engine Foundations.

EXPERIENCE seems to show that, owing to their greater resiliency, brick foundations are less trying to the working parts of stationary engines than foundations built of concrete. The weight of the material in either case may be taken at 130 lbs. per cubic foot, and as a general rule the foundation weight should be from two and a half times the weight of the engine itself, the exact proportion depending upon the type of engine adopted, and upon the outside forces exerted in belt and pump driving. When building stone or brick foundations the supporting surface of the earth should be covered with concrete to a depth of 2 ft. or 3 ft., and in the formation of foundations

entirely of concrete precautions should be taken to prevent the under side from assuming the convex form, a result which frequently happens, owing to the tendency of soft concrete to sink in the centre of a broad and deep foundation. The remedy is to form a dome-shaped bottom, which should be covered with asphalt before concreting is started, and it is also well to bond the concrete in layers 2 ft. thick.

St. Margaret's Hope, N.B.

THE Garden City Association reprint in the form of a pamphlet a series of articles written by the Secretary, Mr. Thomas Adams, and originally published in the *Dundee Advertiser*. Mr. Adams advocates the application of the principles advanced by the Association to the Naval Base about to be established at St. Margaret's Hope, near Dunfermline. It is urged that an absolutely unique opportunity for the laying-out of a model town presents itself concurrently with the scheme of the Admiralty for the establishment of a dockyard on the Firth of Forth. The permanent workshops, store-houses, and other buildings will in all likelihood form the centre in course of time of a resident population exceeding 25,000, a number that will moreover be largely increased as the great mineral resources of the locality are developed, and its trade and manufactures become extended. The deliberate formation and planning of a new town *ab initio* is a chance that seldom occurs in modern times, and we do hope that the opportunity will be taken to make a plan on fine architectural lines, and to lay out the whole town on one complete scheme, even if it can only be partially carried out at first.

Stationers' Hall, Ludgate-hill.

THE Stationers' Company, who celebrated their 500th anniversary on June 10, originally formed a guild of booksellers, and had their first hall in Milk-street, Cheapside. In 1553 they removed to St. Peter's College, near the Deanery House of St. Paul's, which had been the home of the chantry priests. Having received a charter of incorporation from Queen Mary, dated May 4, 1557, they next migrated, *temp.* James I., to Bergavenny House, Ludgate-hill, which belonged to Henry Nevill, fourth Lord Bergavenny, in Queen Elizabeth's reign, and had been the "inn" of the Earls of Pembroke, and previously the residence, *temp.* Edward III., of John Earl of Richmond and Duke of Bretagne. In the old house, consumed by the Great Fire, were a portrait and memorial window of John Reynes, the famous printer, who traded in 1527-44 at the sign of St. George in St. Paul's Churchyard, where John Cawoode, his apprentice, succeeded him. In Hansard's "Typographia" is a view of Bergavenny House, as altered for the Stationers, printed from the original block cut for the Company. The front of the present hall in Stationers' Hall-court was added in 1800 by Robert Mylne. In our number of March 30, 1889, we published an illustration of the window, executed by Messrs. Mayer & Co., after a design by Mr. Joshua W. Butterworth, F.S.A., the donor, and dedicated to Shakespeare. In 1886-7 Mr. Edmund Waller presented a large single-light stained glass window to commemorate St. Cecilia, and another in honour of Tyndale; in July, 1894, was unveiled the Caxton window, replacing the coloured glass by Edgington, in the north end of the hall, which had fallen into decay. At the Hall are preserved portraits of John Bunyan, Samuel Richardson and his wife, Robert Nelson, by Kneller, Prior, Steele, Dr. Hoadley, Bishop of Bangor, William and Andrew Strahan, the King's printers, and Alderman Boydell, who presented the picture by West of King Alfred and the pilgrim. In the hall was held the funeral banquet of Thomas Sutton, founder of the present Charterhouse. The Musical Society in 1683 began their St. Cecilia Feasts, which for a while consisted of a service in St. Bride's, Fleet-street (for which Purcell composed his Te Deum and Jubilate in D), followed, until 1703, by a midday feast in Stationers' Hall and the singing of an ode to St. Cecilia. Dryden, Pope, Congreve, and Shadwell rank amongst the writers of the odes, set to music by Blow, Purcell, Boyce, Greene, Clark, and other famous composers. The north block for the copyright registry, warehouse, and other offices was built in 1887 by Mr. Robert W. Mylne, surveyor (as was his grandfather, Robert Mylne, before him) to the Company.

Drawings by Mr. Herbert Marshall.

AT the Fine Art Society's Gallery is a collection of water-colour drawings by Mr. Herbert Marshall illustrating subjects (as the catalogue rather oddly classifies them) "in London, France, and Holland." The London sketches ring the changes a little too much on the embankment and the Houses of Parliament, which we see silhouetted at almost all angles and from all points of view. Better than any of these we like "Chelsea" (10) with its fine and effective sky, and "Charing Cross Station from the River" (15), not only an admirable little picture but exactly like the place; some of the London street scenes are not altogether so recognisable. The finest and most important of the drawings exhibited however, are to be found among the French subjects. We may especially thank Mr. Marshall for giving us Chartres from two new points of view. Every picture we have hitherto seen of Chartres Cathedral is from nearly the same point—from the small street bridge to the south-east of the cathedral. Mr. Marshall gives us a beautiful view of it (63) from the low ground on the further side, with the river and trees as a foreground, and the town and cathedral rising grandly in the background. Another good Chartres subject is No. 41. "The Château of Amboise" (23) is a perfect picture, and almost equally fine is "A Fortress of Touraine" (31), the composition of which repeats a rather favourite scheme of Turner's—buildings and a hill crowded up on the left, the sloping line of the hill contrasting with the level lines of the plain and the bridge below.

Mr. Menpes' Paintings of the Durbar.

AT Messrs. Dowdeswell's Gallery is exhibited a collection of studies in oil which Mr. Mortimer Menpes has brought back from the Durbar. The interest of such pictures is of course rather topographical and personal than artistic; but, for the kind of thing, these are pictures of quite exceptional talent and force of presentation and execution. Mr. Menpes is not afraid of strong colour and knows how to use it; and his pictures of the picturesquely-costumed native potentates who attended the Durbar seem to bring Indian life and personality more vividly before us than any other artistic memoranda of the kind that we have seen. Single figures or heads form the majority of the subjects; but there are some very effective equestrian pictures, that for instance of "One of the Imperial Cadet Corps" (37). Then there is the native "Marriage Cart" (110) with the bullocks all covered with silver cloth of mail; the characteristic picture of "Veterans Sitting in the Sun before the Durbar" (84); "Watching the Pageant" (72) a scene in a balcony; and "Lord Kitchener Riding through the Streets of Delhi" (97), a very Western figure as the centre of an Eastern scene. The whole collection is well worth a visit.

Engravings at Messrs. Agnew's Galleries.

AT Messrs. Agnew's Old Bond-street Galleries are to be seen one hundred engravings of "Beautiful Women and Children" after English artists of the eighteenth and early nineteenth centuries. This means that we have a collection of fine engravings from many of the most celebrated portraits by Reynolds, Romney, Gainsborough, Hoppner, Lawrence, and others, notable not only as beautiful portraits but as examples of various styles of engraving. Most of them are old friends, but it is pleasant to see so many together in one room. The exhibition is held in aid of the Children's Hospital in Great Ormond-street.

The Submerged Temples at Philæ.

THE collection of water-colour drawings by Mr. F. F. Ogilvie, at the Modern Gallery in Bond-street, is not only of artistic interest, but it serves to give valuable and, unhappily, very melancholy information as to the extent to which Philæ and its remains are injured, and must in time be still further injured, by the raised level of the water in consequence of the Nile Dam operations. We have had optimistic statements that the injury to Philæ would be very slight and not worth considering in view of the great practical advantages of the scheme; but Mr. Ogilvie's careful drawings, showing the condition and aspect of the temples at the highest water level, will convince any one who sees them that the place will be ruined before long. It is too late to protest now, but it is as well that people should know the truth, and we recommend those who are interested in ancient Egypt and her architectural remains to visit this exhibition and see what is the real state of things.

The Handel Festival.

WE may remind the large number of our readers who take an interest in music that the Handel Festival takes place at the Crystal Palace on Saturday and on the Tuesday, Thursday and Saturday, of the following week; the rehearsal at 12 o'clock on Saturday; the Messiah on Tuesday, "Acis and Galatea" and a very interesting miscellaneous selection on the Thursday, and "Israel in Egypt" on the Saturday following; all these performances commencing at 2 p.m. The Handel Festival is one of the best things we do in England, and ought to be supported by all serious lovers of what is noblest and greatest in art.

ARCHITECTURE AT THE ROYAL ACADEMY.—IV.

MR. E. R. SUTTON'S "Gordon Memorial Home, Nottingham" (1,558), is a quiet sensible-looking brick elevation with a stone oriel in each end wing, and plans on an intelligible scale added, but the plans are rather puzzling, as there seems to be no large room for the boys except a dormitory on the upper floor. One would have expected to find a large day-room somewhere; is it on another floor that is not shown? "House at Scarborough" (1,567), Messrs. Cooper and Davis, is a very naive design, a square brick house with a tiled roof and four equally-spaced semicircular bays projecting from it; no plan is given, so we cannot tell what these four bays mean, and pass to "Norwegian Cottage, Chale, Isle of Wight; and Club-house, Parkstone, Dorset" (1,568), by Mr. G. A. B. Livesay; a rather scattered sheet of perspectives and plans. Why should there be a Norwegian house in the Isle of Wight? The Club-house has character. In "Proposed House near Witley" (1,576) Mr. [illegible]-Smith shows a very nice drawing of a quiet stone mullioned house of ordinary type, with a tower in the rear crowned by a rather original little cupola; a cut hedge makes an arcade in front of it; no plan. "The Hermitage, East Grinstead" (1,577), by Mr. E. T. Powell, is an addition on the basis of an old house which, however, seems to be quite swamped by the additions; it is picturesque, but considering that most of the visible portion at any rate is modern, it has rather too much the appearance of an old house added to at different times, with bits of unexpected timber-work here and there—pretty, but rather a piece of contrived scenery. The long drawing-room and dining-room, with windows at the end only, would not be very well lighted at the back; and kitchen, drawing-room and dining-room all have the same aspect, which certainly cannot be right for all of them.

Messrs. Greenaway and Newberry's "Holiday Cottage, Ditchling" (1,588) looks like its name; pretty little white elevations—plaster, or rough-cast, with brick plinth and a red tile roof; small-scale plans are added. Mr. E. W. Marshall's house at Limpsfield (1,589) unfortunately shows no plan, for it looks a very nice specimen of a country house, and is shown in a very pretty water-colour drawing; it appears to be faced with a cream-tinted rough-cast; a gable with curved lines and decorated with some lozenges of red brick (?) makes a characteristic feature. Messrs. Hoare & Wheeler's "A House in the West End of London" (1,597) is a very mechanically drawn and coloured elevation, looking rather like the outer frontispiece of a box of bricks made in Germany, but it has the merit of being simple and unaffected in style, and in good taste.

Mr. W. A. Aickman's "Corner of Exmouth-street, Clerkenwell" (1,600) is a good bit of street architecture of a practical kind; it has a green-tinted ground story (probably glazed bricks), with brick walls above; though very simply treated, the spacing and grouping of the windows has been carefully considered, and the treatment of the double inverted arch over the yard entrance, making practically a kind of strut between the two blocks, is effective. A plan was hardly required, as this is merely the street screen of a row of shops. Mr. Castle's "House at Pilning" (1,605) is just a water-colour sketch of a bit of picturesque effect, got by massing upright half-timber work on a brick base; no plan.

"A Country House" (1,615), by Mr. Oswald Milne, is a design of some originality and worth attention; the plan shows a central parallelogram with two wings (not identical) added at an oblique angle; though picturesque character is evidently aimed at, the plan has been carefully studied; the plans of the rooms are agreeably varied and the question of aspect has not been overlooked; a north point (rare addition to an Academy drawing plan!) is given. The exterior treatment is in red brick, with a strip faced while under the eaves. This would be a pleasant house to live in, and has a good deal of internal interest and variety. "Almshouses in Northamptonshire" (1,625), by Mr. A. A. Carder, is a pleasant homely little block, random-coursed stone on the ground story, while rough-cast above; a small plan is given. Mr. Tanner's "House at Beckenham" (1,630) is a nicely-planned little house illustrated in a very poor pen drawing with scrawls to indicate trees; drawing is not architecture, but still one likes to see it better than this. Mr. A. C. Blomfield's "Hollington House, Newbury" (1,636), is a picturesque country house of the rambling type, shown in a good line drawing; no plan.

Mr. E. Guy Dawber's "Juniper Hill, Surrey" (1,637), is hung too high to see the plan well; the drawing shows the garden front, with a formal garden laid out at one end of the house; the open arcade or loggia in the ground story at one angle is a pleasant incident, and the gabled finish of the chimney-stacks is pretty and piquant. "House at Winchfield" (1,648) is one of Mr. Ernest Newton's studiously plain and unpretending exteriors which seem to have a sort of architectural *cachet* about them, more than many houses which have pilasters and everything proper; it is just the question of the little more or the little less that does it. We wish it had been made complete by the addition of a plan. The "New Music-room, Hatchlands" (1,052) by Mr. R. Blomfield, is a very fine clean line drawing by the architect, in which a difficult bit of perspective is skilfully handled; the drawing is little shaded, and depends for its effect upon good design in line, with nothing to carry it off. It shows a room with columned bays at each end, the centre lighted by a domed light, the base of which is marked out by a modillion cornice with a garland frieze. Altogether one of the best exhibits in the room. Both plan and section are given. No. 1,655, "King's Lynn Grammar School," by Mr. Basil Champneys, appears to have been inspired by a desire to see how poor a skeleton of a drawing the R.A. would consent to hang; it is a brown-ink outline elevation with apparently a studious endeavour to avoid showing any of the effect of the building, and having no plan is of course nearly unintelligible, except that one gathers that there is a central hall with large round-arched windows, which stands back and rises above the rest of the buildings. We have no love for sensational or pretentious drawings; but such an *envoi* as this is going rather too much in the opposite direction. The effective pen drawing of Mr. Leonard Stokes's "Littleshaw, Woldingham" (1,663) has the rather unfortunate appearance, from some defect of perspective, of the building as well as the ground-line running down hill. A small plan is shown and a north point given; the dining-room has a large west window running across the whole width of the room—not a promising arrangement for diners on a warm summer with a nearly level sun, though the exterior appearance of this bay, with this window and a similar one above it, and the arched recess with garden seat underneath, is very pleasant; the chimneys are characteristically treated and the whole drawing excellent, except that there seems to be something irregular about the vanishing point.

Mr. J. W. Simpson's "Board Schools at Brighton" (1,667) is a frame of nice line sketches of bits of the building, but nothing, either in plan or any other way, to show how it pieces together. "A Country Inn at Market Harborough" (1,671), by Messrs. Coates & Johnstone, is a very pretty specimen of its kind; bays with rough-cast (?) faces, on a background of red brick, carrying an overhanging upper story in rough-cast, with three small windows and three small gables over. Mr. Harold Cooper's "Cowhouse and Stud Farm, Porter's Hall, Shenley" (1,676), is an exhibit of a humble but not uninteresting kind, especially as regards the cowhouse, a low building round a quadrangle, showing on the exterior widely projecting eaves and battering buttresses, with very small windows between; a building that makes a nice sketch: plans of both are given. Another building of a plain and practical nature, but not without architectural character, is Messrs. Forsyth & Maule's "Flour Mill, Stedham" (1,681), a square block with a stone ground story with small windows, and a brick superstructure with flat buttresses up to the eaves, and larger windows between; there is no attempt at anything but the plainest treatment, but nevertheless this is a mill that has a certain architectural interest and character about it, and one is glad to find a structure of this kind treated so as to redeem it from mere commonplace. "London Wall Buildings Finsbury-circus" (1,689), by Messrs. Gordon & Gunton, brings us back to the domain of Classic precedent and of the order and rustication, but this is an effective piece of street architecture of its kind. The centre projects into an *avant-corps* decorated with an order and a massive broken pediment with a sculptured figure in the centre; beneath the entablature is a semi-dome alcove or apse, in which opens the principal entrance. The rest is pretty ordinary detail of rusticated windows &c.; but an effective front of its type, and just suited to the *locale* of Finsbury-circus.

ARCHITECTURAL ASSOCIATION SUMMER VISITS:

HEATHFIELD, SUSSEX.

THE first summer visit of the current session was made to Heathfield, in Sussex, by a party of twenty members on Saturday last, June 13, when some recent work at two houses in the district was inspected.

Heathfield House was first visited, and the party was conducted throughout the building by the owner, Mr. W. Alexander, and also by the architect, Mr. Reginald Blomfield, who spared no pains to explain the evolution of the re-building by various plans, sketches, and old prints.

Plans and other illustrations, together with an historical description of the house, appeared in our issue of February 26, 1898, but it may be of some interest to recall briefly that the structure, although possessing new tiled roofs and red brick fronts, is practically an eighteenth-century brick house adapted and re-arranged internally and enlarged at the east and west ends. The Corinthian loggia on the south elevation shows the length of the original house, and was taken down and re-built centrally with this front; the entrance was transferred from the south to the north side; new staircases and a drawing-room have been introduced and broad terraces laid out on the south side.

The offices of the establishment are located in the basement, and form a well-lighted and workmanlike set of apartments. Two features of considerable interest, showing the early existence of a dwelling on this site, were seen in a stone-vaulted chamber below the loggia, and an old stone doorway in the kitchen. The ground-floor apartments are lofty, rectangular chambers, typical of eighteenth century English design, heavy in detail, and it was noticed that the new parts of the house were built in close character with the old. On the first floor, however, some varying levels were met with, owing to the greater height of the old rooms on the floor below, and it was felt that a certain amount of dignity was lost. The top story is roof accommodation lighted throughout by dormer windows.

The architect has well overcome the difficulties which are usually met with in altering or adding to a Classic house of this period, and he has been successful in arranging the rigid lines of the fronts with the irregular interior with very little sacrifice of practical requirements.

The elevations, although based upon the original lines, are designed in Mr. Blomfield's well-known manner; the window openings have quoins and arches in "rubbers," and are filled in with double hung sashes, the detail of which is in scale with the stone quoins and other features; the wood cornice, however, which is carried round the whole building, is very coarse, and out of scale with all the detail seen in conjunction with it. The fronts of the original house, as seen in the print previously referred to, possessed parapets, and by their omission in the rebuilding an opportunity for obtaining increased breadth and dignity in the elevations appears to have been lost.

A visit was afterwards made, by kind permission of the owner, Mr. H. Y. Hare, to North Down, a small eighteenth-century house situated on the highest part of the ridge upon which the village of Heathfield is scattered. The history of the house is a usual one in this locality—a seventeenth-century cottage rebuilt and enlarged in the following century. It is a two-storied dwelling of 9 in. external walls and a good oak-framed roof covered with tiles; the south front is further covered with ornamental hanging tiles of considerable age. The interior has recently been altered, and the whole made habitable. New windows were opened out to obtain the fine view to the north, and to admit light to the centre of the house, where none previously existed. The works also include a small formal garden at the west end laid out in three parts, divided by low brick walls, and the whole is surrounded by stone walls of local material. The head of an

existing well has been raised, which, together with a small open brick water tank in a corresponding position, forms a feature in the design. The lawn on the south front, bordered on three sides by thick hedges, is separated from the house by an entrance drive, which has been enclosed by a brick screen to produce a courtyard effect, and to provide a boundary to the fourth side of the lawn. This screen consists of a low wall, with square brick piers, 7 ft. 6 in. high, built at 9-ft. intervals, and spanned by fir lintols; climbing plants will be trained up the piers and be carried along the beams.

Much interest was taken in the drainage work, carried out upon the lines advocated by Dr. Poore. Earth closets are in use, and the usual disposal resorted to; but the dirty water from the sinks, bath, and lavatory, and the bedroom slops from the external slop sink, are carried some 25 ft. away from the house in open, glazed-channel pipes into a long, open filtration gutter, through which the liquids eventually find their way into the porous soil of the site. This work has been carried out by Mr. Mepham, builder, Heathfield, from the designs and under the supervision of Messrs. Forsyth & Maule, architects, London.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

AN Eastern Counties District meeting of the members of the Association of Municipal and County Engineers was held at the Town Hall, Sudbury, on Saturday, June 13. Mr. T. H. Yabbicom, C.E., of Bristol, President of the Association, presided, and there were present Messrs. W. Weaver (Kensington), Nisbet Blair (St. Pancras), Howard Smith (Westminster), Chambers Smith (Sutton), J. T. Eayrs (Birmingham), Metcalfe (Newmarket), E. Buckham (Ipswich), W. Dawson (Leyton), and others.

At the outset the Mayor offered the members a hearty welcome to the town.

The President acknowledged the welcome giving to the Association.

A vote of condolence was passed with the family of the late Mr. Sasse, Borough Engineer of Chelmsford, who had died after sending a letter expressing regret at his inability to attend the meeting owing to illness.

Mr. T. W. A. Hayward, A.M.Inst.C.E., Borough Surveyor and Engineer, read a paper on "Six Years' Municipal Work at Sudbury." He said that Sudbury lay in the valley of the river Stour, which separated Suffolk from Essex, part of the borough being in Suffolk and part in Essex. It could be approached by water from the North Sea by means of the river Stour, which is navigable as far as Sudbury. The population in 1901 was 7,109, the rateable value 21,000*l*., and the area 2,093 acres. The rateable value was very low, and this was where any expenditure was most keenly felt, a penny rate only producing approximately 80*l*. Under a private Act of Parliament a loan for 10,000*l*. was taken up for street improvement, and was still owing, none of the principal sum being repaid, as was now usual. The loans under sanction of the Local Government Board for works of water supply, street improvement, sewerage and sewage disposal, refuse-destructor, and other public works still outstanding amounted to 33,740*l*. The water supply of the borough had a somewhat unique history. In 1870 the Town Council were served with the order from the Local Government Act office to provide a proper supply of water within six weeks from the date of the order. The Council refused to comply, and Mr. Hinnell, C.E., of Westminster, was appointed by the Home Secretary and carried out the work at a cost of 7,500*l*. Originally there was an abundant supply of water, but this had fallen off considerably since the earthquake of 1884, which by some means reduced the supply by about one-half. For many years prior to his appointment the water question had been a cause of considerable anxiety to the Corporation. They had obtained expert advice, had deepened the well, extended the boring, and had done various other things to try to increase the supply, but without any satisfactory results. Gaugings were taken as to the inflow of water into the well through the bore-tube, and it was found that the supply at that time was sufficient for the reasonable needs of the borough. Attention was next given to the distribution, when it was found that an average of twenty-five gallons per head per day was being sent from the storage-reservoir into the town. This being high, some investigations were made, and the Corporation purchased some Deacon waste-detecting meters, when several large leakages were detected which had probably been going on in the mains for a great number of years. When the leakages were stopped it was found that a continuous supply of water could be given, whereas previously it had been shut down for seven hours every day. The author had prepared a scheme which, by increasing the storage capacity at the bottom of the well, would permit the pump being driven at a normal rate continuously throughout the day, and it was expected that during the night the inflow from the bore-tube would raise the water to its normal level. This scheme had been accepted by the Town Council, and approved by the Local Government Board. With reference to the sewerage scheme, it was at first decided to lay new sewers in the main streets only, leaving out the low-lying and properties otherwise difficult to drain. This scheme was, however, incomplete, and when it was reported upon by Mr. J. T. Eayrs, M.Inst.C.E. (whom the Council consulted), this cheese-paring policy was abandoned. Mr. J. T. Eayrs, however, approved the general design of the scheme so far as it went, and after receiving his Report the Committee gave the author directions to prepare a complete scheme as recommended. 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The President, in moving a vote of thanks to Mr. Hayward, said he would like to know whether the water supply in the neighbourhood was affected also by this earthquake in the same way as the supply was affected at Sudbury.

Mr. J. T. Eayrs, Birmingham, said he also was much struck by the falling-off in the supply of water owing to the earthquake. It was the first time he had heard that reason given for a deficiency in a supply of water. He would like to know the effect upon the neighbouring wells. He considered Mr. Hayward was to be congratulated in having reduced the consumption of water by one-half. It was a constant supply, the public had whatever they liked, and twelve gallons per head per day seemed to be sufficient.

Mr. W. Weaver, Kensington, referred to the financial difficulties that beset the town, and, looking at the loans to rateable value, he was not at all surprised that the Local Government Board would not allow them to raise any more money. If Mr. Hayward could not find an outlet for all his clinker in the bacteria beds he might press it into blocks mixed with a little Trinidad asphalt, and pave his streets with the refuse of the dustbins at a very cheap rate.

Mr. E. Buckham, Ipswich, expressed himself as pleased at the utilisation of the heat from the destructor for pumping at the sewage works.

Mr. A. D. Greatorex, West Bromwich, said Mr. Hayward had done very good work in detecting the waste of water. The sewage scheme he had designed was thoroughly up-to-date in every respect. He would like to utter one word of warning against the use of clinker from the destructor for the bacteria beds. His objection to the use of clinker was that it broke up into dust, and the beds lost 50 or 60 per cent. of their capacity in a very short time. There was a saving of money in the long run by using a hard material in the beds. He did not agree with the principle adopted in Sudbury of the Council paying half the cost of making up private streets. That was one of the faults of the 1892 Act, and to his mind was quite sufficient to prevent any Corporation adopting it. It was not fair to the ratepayers to be called upon to pay half the cost of making up streets for owners of property.

Mr. Chambers Smith, Sutton, said the sewerage scheme seemed to be very efficiently carried out. He noticed that flints were used in the coarse beds. Flints were extremely good in their way, but if they could get a good hard vitreous clinker, it was better than washed flints. If they could get their destructor refuse thoroughly well burnt and vitreous, it was the best material they could use; but unless it was thoroughly well burnt, he would advise them not to use it. He was taking out burnt ballast because of its tendency to disintegrate.

Mr. Ryley agreed with Mr. Greatorex as to the filtering media to be used in the beds. He did not think it advisable to use clinker.

Mr. W. Nisbet Blair, St. Pancras, referred to the very important reform Sudbury had carried out in regard to its house-refuse system. The system of ashpits holding one, two, or three months' refuse was about as abominable as anything that could be devised, and the sooner it was entirely abolished the better. The effect of that system was evidenced by the statement that the death rate was 18 per 1,000 per annum. That struck him as very high for a small town in a healthy part of the country. The death rate should not be more than half that, and

probably they would find when they adopted the portable dust-bins and the weekly removal of refuse, that the death rate would go down considerably. Sudbury was to be congratulated on altering the system.

Mr. Brown did not agree with Mr. Greatorex as to the use of clinker in the bacteria beds, as he believed a good vitreous clinker to be as good a material as could be obtained.

Mr. Caperd, Epsom, asked whether the Local Government Board sanctioned the plan for turning the effluent from the beds direct into the stream.

Ald. Wheeler: Yes.

Mr. Goodyear, Colchester, said he was much surprised to hear of the falling off in the water supply from the earthquake of 1884. At Colchester it increased the water by 36 ft. head in the well. But since then it had been gradually going down about 4 in. a year, and was now below the normal level.

Mr. Hayward, in reply, said with regard to the earthquake, he understood that what they had lost at Sudbury they gained at Colchester, so there was no material loss to the community generally. And the water was coming back to Sudbury. They had a rather better supply now than they had four years ago. The rainfall in the eastern district was very much below the average rainfall for England—it was under 20 in. With regard to the water consumption of 25 gallons per head, they had about one-third of the houses using water-closets. As a result of the detection of waste they had saved about 4,000 gallons of water per hour. With regard to private streets, he advised the Corporation to make the full charge, but was overruled, and the members of the Corporation were now sorry they did not take his advice. The scheme provided for the taking of the effluent over the land and discharging it in the deep part of the river. The Local Government Board thought it would be a waste of money to carry the effluent into deep water, and they struck it out and allowed it to be discharged direct into a sluggish water-course. Mr. Weaver asked as to the rateable value and the rates. The fact of the rates being heavy was not the fault of the Corporation, as the poor rate was three times what it was six years ago.

The Mayor entertained the members to luncheon, and the afternoon was given up to visits to the various works.

THE INSTITUTION OF CIVIL ENGINEERS:

ENGINEERING CONFERENCE.

OPENING ADDRESS OF THE PRESIDENT, MR. J. C. HAWKSHAW, M.A., ON WEDNESDAY.

WE have met here to-day to open the third Engineering Conference. The first was held in 1897, six years ago, and the second in 1899, so that four years have passed since the last Conference. If these Conferences are held at short intervals there may perhaps be some danger of exhausting the interest in them, and, indeed, their actual usefulness. But whatever be the interval between them, might it not be possible for the Institution to enjoy some further benefit from these Conference Committees, dealing with the various sections of its work, if they were to meet once or twice between the actual Conferences for the consideration of questions touching intimately their respective branches? For example, they might consider and recommend to the Council what subjects, in their respective departments, it would be desirable to have discussed at the Institution during each session, and to suggest names of persons who might be applied to to contribute papers on these subjects. By such means it is possible that the subjects of the papers brought forward for reading and discussion at the Institution meetings might be benefited through their selection by a committee of experts in their respective departments.

Although four years have passed since the last Conference was held, many of those attending here to-day will have availed themselves of the opportunity of discussing engineering questions afforded by the International Engineering Conference at Glasgow two years ago. Much may happen in these days in engineering in so short a period as two years. Engineering does not stand still, and striking developments are taking place, more especially in the electrical branch of the profession. Some great works have been completed in the last two years: to name two only, both connected with the distribution of water—the Nile dams for irrigation purposes and the Coolgardie water-supply. For the latter, water is pumped up 1,200 ft. and conveyed over 300 miles inland in steel pipes.

The last two years have been marked by the work done by the Engineering Standards Committee, work of which it is impossible to overrate the importance to the trade of this country. This Committee, which began its work in April, 1901, is the outcome of a Committee appointed by the Institution of Civil Engineers at the suggestion of Sir J. Wolfe Barry. It has been supported actively and financially by the five leading technical societies and by the Government, who, on the recommendation of the Board of Trade, have made a grant of 3,000*l.* towards the necessary expenses. Sir F. Hopwood, in conveying to the Standards Committee the decision come to by the Treasury, said that the Board of Trade regarded the work undertaken by the Committee of the highest value to the country at large. Some idea of the magnitude of the work undertaken may be gained from the following figures:—There are twenty-three committees and sub-committees, made up of 296 members, of whom twenty-four are Government representatives. So far only one Committee, that on Building and General Bridge Construction, and one Sub-Committee, that on tramway rails, have issued the result of their decision, but the conclusions of all are now in an advanced stage.

You will have no lack of interesting subjects for discussion during the next two or three days, as you will see from the programme of the meetings, giving the subjects to be brought before you at the meetings of the sections. You will have an opportunity of discussing the question of the position of apprenticeship in engineering education—a condition specifically required for a prescribed term by the Institution rules, although the latter admit as an alternative to pupilage training as an assistant, provided the experience covers work both in the office and in or upon works. The precise manner of the fulfilment of the condition referred to is left open by the Institution to meet the variations involved by the many different branches of engineering.

No subject at the present time attracts or deserves to attract so much notice as education. The Education Act of 1902 is now in force, and every County Council, together with the trustees and managers of every elementary school throughout the country, are at work making new arrangements in accordance with the Act.

The education and training of engineers is no new subject to our Institution, which has been occupied, first, during the last fourteen years, on the question of the requisite preliminary education of civil engineers; and, secondly, during the last seven years, on the question of engineering training. Under the able guidance of our past-President, Sir J. Wolfe Barry, the Chairman of the Education Committee of the Council, with the aid of such authorities in various branches as Sir William White, Sir Guilford Molesworth, Dr. Kennedy, Professor Unwin, Mr. Siemens, and others who are well qualified to deal with the question of engineering training, much has been done. Examinations are held twice a year for the admission of students and Associate Members, and arrangements are also made for examining those abroad, in the colonies, in India, and elsewhere. The syllabus of our subjects for examination has been altered from time to time as the need for change became apparent. The subjects of examination in force at the Universities, and other educational establishments at home and abroad, have been carefully considered, and the degrees and certificates only of such bodies as came up to our requirements, which have been laid down with care, have been allowed as qualifying for admission into our Institution. The result has been that many important teaching institutions at home and abroad have already modified their curricula and the standard of their examinations to accord with the Institution practice, and others are preparing to do so. The requirements of the Institution, both as regards preliminary education, scientific attainments, and specific practical training, have been drawn so as to be applicable to the cases of all who seek to prepare themselves to become proficient civil engineers in whatever branch of the profession they propose to practise chiefly. Thus the work done by the Council has had a stimulating effect on the training of engineers throughout the country.

The education of officers for the Navy and for the Army is being reorganised. At our annual dinner Lord Selborne, in a speech of the greatest interest to us engineers, gave us his views on the education of naval officers. In future, he told us, the men who command our ships, our squadrons, and our fleets must have the same corresponding knowledge of steam, electricity, and hydraulics, and the other forces employed in the modern battleship, as they have of the art of navigation or the science of gunnery, or the use of the torpedo. The men, in fact, who have to direct and control modern battleships, the most complicated aggregations of machinery in existence, will not in future be wanting in the necessary engineering knowledge. The Navy will now offer a career to engineers, or to their sons, for those who would join must join young, in which, though they must be sailors first, they must also be one and all engineers if they would be masters in the finest of all professions.

Not only at sea does the Admiralty offer a career to engineers, but on land also in the Admiralty Works Department. Appointments to the staff of that department are made, moreover, at a much later age than for the sea service. The limits of age are twenty-three to twenty-eight years for Assistant Civil Engineers, and the entry is by open competitive examination held by the Civil Service Commission. The variety and great importance of the works carried out at our great naval stations at Portsmouth, at Keyham, at Gibraltar and Malta, and elsewhere should make the opening an attractive one for our younger engineers.

There would appear to be reasons why the education of engineers for our profession and of officers for the Navy should be carried out on somewhat the same lines. In both professions the duties may become highly specialised, and yet the training for all branches should at first be the same. What branch is more specialised than that of the electrical engineer? and yet he has to deal with the same problems as the railway engineer in questions of transport and locomotion, as the gas engineer in questions of lighting, as the chemical engineer in questions of the application of electricity to industries, and so on. The engineer who would reach the highest position in his profession should have a knowledge of organisation, of administration, and of finance, besides the necessary knowledge of the branch to which he specially devotes himself. And so it is in the Navy. Besides the officer's knowledge of his special branch, be it navigation, gunnery, torpedo work or engineering, he must have a general knowledge of engineering in which all his movements and his means of offence and defence depend, and however perfect he may be in his special branch, he cannot dissociate himself altogether from the other special branches, and if he would rise to the highest position, he too must have capabilities for organisation and administration.

In my address at the beginning of this session last November, I took occasion to refer at some length to the question of our timber supply. Since then the Committee appointed by the Board of Agriculture to inquire into and report on British forestry—which I noticed as then sitting—has issued its Report. The recommendations in that Report are chiefly educational. Valuable and necessary as the recommendation as to the necessity of educating the different classes occupied in forestry, the Report is, to my mind, disappointing. More should have been said of the necessity of doing something to encourage planting. It is useless training foresters unless you provide work for them to do. At present the local authorities distinctly discourage planting by rates and otherwise. In my own county of Sussex, one of the best wooded in the country, a sporting rate is to be imposed, which is a direct tax on planting, planted land being rated at five times the amount of the rate on unplanted land.

In London many problems remain to be solved which require the assistance of the engineer. We have dealt with the sewage question, and remove some millions of tons of sewage daily by water underground, but we have yet to grapple with the removal of the solid matter, with which we daily pollute, not only the atmosphere of London, but that of the country for many miles round. Many of the

existing well has been raised, which, together with a small open brick water tank in a corresponding position, forms a feature in the design. The lawn on the south front, bordered on three sides by thick hedges, is separated from the house by an entrance drive, which has been enclosed by a brick screen to produce a courtyard effect, and to provide a boundary to the fourth side of the lawn. This screen consists of a low wall, with square brick piers, 7 ft. 6 in. high, built at 9-ft. intervals, and spanned by fir lintols; climbing plants will be trained up the piers and be carried along the beams.

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In the original scheme the author made provision for conveying the effluent from the land to the river and discharging it into deep water, but the Local Government Board thought that after treatment upon land was unnecessary, and suggested that the effluent should be discharged into the nearest water-course, although it was a very sluggish one—in fact, practically dead level.

The President, in moving a vote of thanks to Mr. Hayward, said he would like to know whether the water supply in the neighbourhood was affected also by this earthquake in the same way as the supply was affected at Sudbury.

Mr. J. T. Eayrs, Birmingham, said he also was much struck by the falling-off in the supply of water owing to the earthquake. It was the first time he had heard that reason given for a deficiency in a supply of water. He would like to know the effect upon the neighbouring wells. He considered Mr. Hayward was to be congratulated in having reduced the consumption of water by one-half. It was a constant supply, the public had whatever they liked, and twelve gallons per head per day seemed to be sufficient.

Mr. W. Weaver, Kensington, referred to the financial difficulties that beset the town, and, looking at the loans to rateable value, he was not at all surprised that the Local Government Board would not allow them to raise any more money. If Mr. Hayward could not find an outlet for all his clinker in the bacteria beds he might press it into blocks mixed with a little Trinidad asphalt, and pave his streets with the refuse of the dustbins at a very cheap rate.

Mr. E. Buckham, Ipswich, expressed himself as pleased at the utilisation of the heat from the destructor for pumping at the sewage works.

Mr. A. D. Greatorex, West Bromwich, said Mr. Hayward had done very good work in detecting the waste of water. The sewage scheme he had designed was thoroughly up-to-date in every respect. He would like to utter one word of warning against the use of clinker from the destructor for the bacteria beds. His objection to the use of clinker was that it broke up into dust, and the beds lost 50 or 60 per cent. of their capacity in a very short time. There was a saving of money in the long run by using a hard material in the beds. He did not agree with the principle adopted in Sudbury of the Council paying half the cost of making up private streets. That was one of the faults of the 1892 Act, and to his mind was quite sufficient to prevent any Corporation adopting it. It was not fair to the ratepayers to be called upon to pay half the cost of making up streets for owners of property.

Mr. Chambers Smith, Sutton, said the sewerage scheme seemed to be very efficiently carried out. He noticed that flints were used in the coarse beds. Flints were extremely good in their way, but if they could get a good hard vitreous clinker, it was better than washed flints. If they could get their destructor refuse thoroughly well burnt and vitreous, it was the best material they could use; but unless it was thoroughly well burnt, he would advise them not to use it. He was taking out burnt ballast because of its tendency to disintegrate.

Mr. Ryley agreed with Mr. Greatorex as to the filtering media to be used in the beds. He did not think it advisable to use clinker.

Mr. W. Nisbet Blair, St. Pancras, referred to the very important reform Sudbury had carried out in regard to its house-refuse system. The system of ashpits holding one, two, or three months' refuse was about as abominable as anything that could be devised, and the sooner it was entirely abolished the better. The effect of that system was evidenced by the statement that the death rate was 18 per 1,000 per annum. That struck him as very high for a small town in a healthy part of the country. The death rate should not be more than half that, and

probably they would find when they adopted the portable dust-bins and the weekly removal of refuse, that the death rate would go down considerably. Sudbury was to be congratulated on altering the system.

Mr. Brown did not agree with Mr. Greatorex as to the use of clinker in the bacteria beds, as he believed a good vitreous clinker to be as good a material as could be obtained.

Mr. Caperd, Epsom, asked whether the Local Government Board sanctioned the plan for turning the effluent from the beds direct into the stream.

Ald. Wheeler: Yes.

Mr. Goodyear, Colchester, said he was much surprised to hear of the falling off in the water supply from the earthquake of 1884. At Colchester it increased the water by 36 ft. head in the well. But since then it had been gradually going down about 4 in. a year, and was now below the normal level.

Mr. Hayward, in reply, said with regard to the earthquake, he understood that what they had lost at Sudbury they gained at Colchester, so there was no material loss to the community generally. And the water was coming back to Sudbury. They had a rather better supply now than they had four years ago. The rainfall in the eastern district was very much below the average rainfall for England—it was under 20 in. With regard to the water consumption of 25 gallons per head, they had about one-third of the houses using water-closets. As a result of the detection of waste they had saved about 4,000 gallons of water per hour. With regard to private streets, he advised the Corporation to make the full charge, but was overruled, and the members of the Corporation were now sorry they did not take his advice. The scheme provided for the taking of the effluent over the land and discharging it in the deep part of the river. The Local Government Board thought it would be a waste of money to carry the effluent into deep water, and they struck it out and allowed it to be discharged direct into a sluggish water-course. Mr. Weaver asked as to the rateable value and the rates. The fact of the rates being heavy was not the fault of the Corporation, as the poor rate was three times what it was six years ago.

The Mayor entertained the members to luncheon, and the afternoon was given up to visits to the various works.

THE INSTITUTION OF CIVIL ENGINEERS:

ENGINEERING CONFERENCE.

OPENING ADDRESS OF THE PRESIDENT, MR. J. C. HAWKSHAW, M.A., ON WEDNESDAY.

We have met here to-day to open the third Engineering Conference. The first was held in 1897, six years ago, and the second in 1899, so that four years have passed since the last Conference. If these Conferences are held at short intervals there may perhaps be some danger of exhausting the interest in them, and, indeed, their actual usefulness. But whatever be the interval between them, might it not be possible for the Institution to enjoy some further benefit from these Conference Committees, dealing with the various sections of its work, if they were to meet once or twice between the actual Conferences for the consideration of questions touching intimately their respective branches? For example, they might consider and recommend to the Council what subjects, in their respective departments, it would be desirable to have discussed at the Institution during each session, and to suggest names of persons who might be applied to to contribute papers on these subjects. By such means it is possible that the subjects of the papers brought forward for reading and discussion at the Institution meetings might be benefited through their selection by a committee of experts in their respective departments.

Although four years have passed since the last Conference was held, many of those attending here to-day will have availed themselves of the opportunity of discussing engineering questions afforded by the International Engineering Conference at Glasgow two years ago. Much may happen in these days in engineering in so short a period as two years. Engineering does not stand still, and striking developments are taking place, more especially in the electrical branch of the profession. Some great works have been completed in the last two years: to name two only, both connected with the distribution of water—the Nile dams for irrigation purposes and the Coolgardie water-supply. For the latter, water is pumped up 1,200 ft. and conveyed over 300 miles inland in steel pipes.

The last two years have been marked by the work done by the Engineering Standards Committee, work of which it is impossible to overrate the importance to the trade of this country. This Committee, which began its work in April, 1901, is the outcome of a Committee appointed by the Institution of Civil Engineers at the suggestion of Sir J. Wolfe Barry. It has been supported actively and financially by the five leading technical societies and by the Government, who, on the recommendation of the Board of Trade, have made a grant of 3,000*l.* towards the necessary expenses. Sir F. Hopwood, in conveying to the Standards Committee the decision come to by the Treasury, said that the Board of Trade regarded the work undertaken by the Committee of the highest value to the country at large. Some idea of the magnitude of the work undertaken may be gained from the following figures:—There are twenty-three committees and sub-committees, made up of 296 members, of whom twenty-four are Government representatives. So far only one Committee, that on Building and General Bridge Construction, and one Sub-Committee, that on tramway rails, have issued the result of their decision, but the conclusions of all are now in an advanced stage.

You will have no lack of interesting subjects for discussion during the next two or three days, as you will see from the programme of the meetings, giving the subjects to be brought before you at the meetings of the sections. You will have an opportunity of discussing the question of the position of apprenticeship in engineering education—a condition specifically required for a prescribed term by the Institution rules, although the latter admit as an alternative to pupilage training as an assistant, provided the experience covers work both in the office and in or upon works. The precise manner of the fulfilment of the condition referred to is left open by the Institution to meet the variations involved by the many different branches of engineering.

No subject at the present time attracts or deserves to attract so much notice as education. The Education Act of 1902 is now in force, and every County Council, together with the trustees and managers of every elementary school throughout the country, are at work making new arrangements in accordance with the Act.

The education and training of engineers is no new subject to our Institution, which has been occupied, first, during the last fourteen years, on the question of the requisite preliminary education of civil engineers; and, secondly, during the last seven years, on the question of engineering training. Under the able guidance of our past-President, Sir J. Wolfe Barry, the Chairman of the Education Committee of the Council, with the aid of such authorities in various branches as Sir William White, Sir Guilford Molesworth, Dr. Kennedy, Professor Unwin, Mr. Siemens, and others who are well qualified to deal with the question of engineering training, much has been done. Examinations are held twice a year for the admission of students and Associate Members, and arrangements are also made for examining those abroad, in the colonies, in India, and elsewhere. The syllabus of our subjects for examination has been altered from time to time as the need for change became apparent. The subjects of examination in force at the Universities, and other educational establishments at home and abroad, have been carefully considered, and the degrees and certificates only of such bodies as came up to our requirements, which have been laid down with care, have been allowed as qualifying for admission into our Institution. The result has been that many important teaching institutions at home and abroad have already modified their curricula and the standard of their examinations to accord with the Institution practice, and others are preparing to do so. The requirements of the Institution, both as regards preliminary education, scientific attainments, and specific practical training, have been drawn so as to be applicable to the cases of all who seek to prepare themselves to become proficient civil engineers in whatever branch of the profession they propose to practise chiefly. Thus the work done by the Council has had a stimulating effect on the training of engineers throughout the country.

The education of officers for the Navy and for the Army is being reorganised. At our annual dinner Lord Selborne, in a speech of the greatest interest to us engineers, gave us his views on the education of naval officers. In future, he told us, the men who command our ships, our squadrons, and our fleets must have the same corresponding knowledge of steam, electricity, and hydraulics, and the other forces employed in the modern battleship, as they have of the art of navigation or the science of gunnery, or the use of the torpedo. The men, in fact, who have to direct and control modern battleships, the most complicated aggregations of machinery in existence, will not in future be wanting in the necessary engineering knowledge. The Navy will now offer a career to engineers, or to their sons, for those who would join must join young, in which, though they must be sailors first, they must also be one and all engineers if they would be masters in the finest of all professions.

Not only at sea does the Admiralty offer a career to engineers, but on land also in the Admiralty Works Department. Appointments to the staff of that department are made, moreover, at a much later age than for the sea service. The limits of age are twenty-three to twenty-eight years for Assistant Civil Engineers, and the entry is by open competitive examination held by the Civil Service Commission. The variety and great importance of the works carried out at our great naval stations at Portsmouth, at Keyham, at Gibraltar and Malta, and elsewhere should make the opening an attractive one for our younger engineers.

There would appear to be reasons why the education of engineers for our profession and of officers for the Navy should be carried out on somewhat the same lines. In both professions the duties may become highly specialised, and yet the training for all branches should at first be the same. What branch is more specialised than that of the electrical engineer? and yet he has to deal with the same problems as the railway engineer in questions of transport and locomotion, as the gas engineer in questions of lighting, as the chemical engineer in questions of the application of electricity to industries, and so on. The engineer who would reach the highest position in his profession should have a knowledge of organisation, of administration, and of finance, besides the necessary knowledge of the branch to which he specially devotes himself. And so it is in the Navy. Besides the officer's knowledge of his special branch, be it navigation, gunnery, torpedo work or engineering, he must have a general knowledge of engineering in which all his movements and his means of offence and defence depend, and however perfect he may be in his special branch, he cannot dissociate himself altogether from the other special branches, and if he would rise to the highest position, he too must have capabilities for organisation and administration.

In my address at the beginning of this session last November, I took occasion to refer at some length to the question of our timber supply. Since then the Committee appointed by the Board of Agriculture to inquire into and report on British forestry—which I noticed as then sitting—has issued its Report. The recommendations in that Report are chiefly educational. Valuable and necessary as the recommendation as to the necessity of educating the different classes occupied in forestry, the Report is, to my mind, disappointing. More should have been said of the necessity of doing something to encourage planting. It is useless training foresters unless you provide work for them to do. At present the local authorities distinctly discourage planting by rates and otherwise. In my own county of Sussex, one of the best wooded in the country, a sporting rate is to be imposed, which is a direct tax on planting, planted land being rated at five times the amount of the rate on unplanted land.

In London many problems remain to be solved which require the assistance of the engineer. We have dealt with the sewage question, and remove some millions of tons of sewage daily by water underground, but we have yet to grapple with the removal of the solid matter, with which we daily pollute, not only the atmosphere of London, but that of the country for many miles round. Many of the

fine old trees for which the neighbourhood of London was noted, have gone, and moreover, an ever-widening area must follow. The destruction of the fine collection at Kew is only a question of time. Sir W. Thiselton-Dyer, after a week's fog, found a deposit of tarry matter on the greenhouses at Kew at the rate of six tons to the square mile. Dr. W. N. Shaw, at the Sanitary Congress at Manchester, estimated, roughly he admits, that it takes seven million tons of air a day to carry away the smoke, compared with one million tons of water a day required to carry away the sewage. A bad fog may cost 5,000*l.* a day for light alone, and the estimate made of the cost of smoke pollution to London, which puts it at as much as five millions a year, is probably below the mark.

Another question which becomes yearly more pressing in London is that of the means of locomotion and transport. Like smoke pollution, our neglect to deal with it is yearly costing the growing population of London a large sum. The King, recognising the importance of this question, has been pleased to appoint a Royal Commission "to report as to the measures they deem most effectual for the improvement of the same, by the development and inter-connection of railways and tramways, on or below the surface, by increasing facilities for other forms of mechanical locomotion, by better provision for the organisation and regulation of vehicular and pedestrian traffic or otherwise; and further to report as to the desirability of establishing some central authority or tribunal to which all schemes of railway or tramway construction of a local character should be referred, and the powers which it would be desirable to confer on such a body." The terms of reference are very wide, and it will tax the powers of even so able a body as the Royal Commission which has been appointed, to find a satisfactory solution. The more facilities you give for travelling and locomotion, the more persons you encourage to travel and take advantage of the better means of transport and locomotion, so that the application of the remedy tends in some measure to spread the disease. Decentralisation is what is wanted, and if facilities for transport and locomotion encourage this, it will be a distinct gain to London, especially if it affects factories and workshops, the greatest offenders, with slow and obstructive traffic and smoke pollution. I know of one firm of manufacturers of machinery who have recently removed their long-established works from London to the country, and were enabled by doing so to reduce their prices by 20 per cent., which enables them the better to compete in foreign markets.

As regards the best means of passenger transport, we have had experience of how the advent of railways checked the progress of canals and also of motors, which were far advanced nearly a century ago. It is to be hoped that tramways will not again check the progress of motors, and their use, not only for private, but for public service. Tram-lines render roads less suitable or serviceable for all other kinds of traffic. It is well worth considering whether it would not be advisable to make roads suitable for motor traffic of all kinds, and let motors serve public as well as private purposes. Railways afford greater facilities than canals, but motors offer greater facilities than either railways or tramways, and though all three are necessary, nothing should be allowed to check the legitimate development of motor traffic.

To one who observes the changes which are taking place on many country roads it is obvious that the question of their making and their maintenance will have to be considered, and that very soon. On Whit Monday, one of our members tells me he had the curiosity to count the number of machines passing on the Brighton Road near Horley. In eleven minutes 209 motors and motor or other cycles passed, taking those going in one direction only. Probably few of the persons using them had contributed anything to the making or maintenance of the road. . . .

WESLEYAN CHAPEL, SUNDERLAND.—The new halls and club-rooms at the Sans-street Wesleyan Chapel, Sunderland, were opened on the 10th inst. The new buildings, which have cost about 3,000*l.*, include on the ground floor three vestries, and on the second floor a hall 50 ft. by 20 ft. and a vestry. The workmen's club is on the west of the main building. The whole of the building is heated with hot-water radiators, placed under the windows. Messrs. W. & T. R. Milburn are the architects.

Illustrations.

DESIGN FOR LIVERPOOL CATHEDRAL.

WE illustrate this week the design submitted for Liverpool Cathedral by Messrs. Austin & Paley, of Lancaster, whose name is so well known in connexion with church architecture.

In explanation of the design we reprint the architects' Report sent in with the drawings, which is as follows:—

"In this Report the Elevations, &c., will be Described as if they Faced with the usual Orientation.

The accompanying design has for its main features a nave, choir, and transepts, all 62 ft. in width exclusive of aisles. The transepts are short, being 33 ft. long, and at the crossing a partly octagonal lantern with a projecting gallery and large windows is planned. Towers about 38 ft. square open with wide and lofty arches into the ends of the transepts.

It is probable that western towers would detract from the length of the cathedral as seen from the west, which has a very important approach; and it is thought that the lofty towers as planned would group well with the central lantern and dome, and in perspective it is found that these form a satisfactory and commanding group or mass; the west end, which above the porches is slightly octagonal on plan, is, however, flanked by large 20-ft. octagonal turrets at each angle.

The aisles generally round the nave and choir are not intended for seats, but would be used as passages and for monuments, arched recesses in the outer walls being introduced for this purpose. The space behind the chancel screen at east end of choir might also be reserved for monuments.

The length of the cathedral exclusive of west porch is about 450 ft. and the height of the nave groining is 102 ft., the choir being 2 ft. 6 in. higher. The width of the central lantern arches is 54 ft. in the clear, which is about 4 ft. in excess of those under the dome of the cathedral at Florence, but much less than those under the dome of St. Sophia (Fergusson). The walls are 9 ft. in thickness, and the arches have most ample abutment, the lantern walls over the points of the arches being comparatively light. The weight on the lantern piers at the base would be about 24 tons per foot, and on the nave piers 20 tons per foot. The nave and choir columns are 35 ft. high, and the height to ridge of nave roof is 139 ft., to the cross on dome, 304 ft., and the height of the towers is 240 ft. from the floor line.

The choir being of unusual width allows of the stalls being placed quite within its space and 11 ft. from each side wall, with a surrounding low screen and gates instead of the usual high screen, thus ensuring the choir being in close proximity to the congregation under the lantern. The high open screen enclosing the sanctuary would begin immediately east of the choir stalls, and be continued behind the reredos, as shown on plan. Lecterns are shown on each side of the choir adjoining the lantern space so as to be near to the congregation. In the case of general daily services the inner aisles adjoining the choir stalls would be available for the worshippers, the number of sittings including those in the choir and stalls being 580.

With regard to the 3,000 worshippers required it appears that the area taken up by each chair, including its proportion of passage room, is 7 ft. superficial; on this basis the 102-ft. square under the dome of St. Paul's Cathedral would seat 1,500 persons, and at a distance of 155 ft. from the pulpit, including the nave and transepts to this extent, but exclusive of the choir (which is not commanded by the pulpit) 2,250 persons can be seated in St. Paul's. In this plan for Liverpool Cathedral at the same distance of 155 ft. from the preacher 2,500 persons can be seated under the lantern, in transepts and towers, and in the portion of nave as shown, with an additional 500 in the choir and its inner aisles, as this space would be commanded by the pulpit, making in all 3,000 convenient sittings with no pillar obstructing, within 155 ft. of the pulpit, and with ample passage space. Of these, 2,700 would be within 130 ft. of the pulpit. The pulpit is well backed by the large wall space of the lantern pier. A very large proportion of the 3,000 would be immediately in view of the east end.

The morning chapel is placed on the north side of the choir, and is correctly orientated, but owing to the dimensions of the site cannot be of great length. It has, therefore, aisles on each side, and would have 300 sittings. Both its aisles as well as its nave have entrances from the choir aisle. Immediately within the church at the west end two lofty columns with arches are carried up to the groining vault, so as to break up the extreme width and also aid the acoustics. The space so obtained is utilised for a baptistry on the north side. A special section shows this feature of the design. The organ is placed in galleries on each side of the choir, and continued into large organ transepts with lofty arches, and with extra openings for sound on their western sides. The galleries would be constructed on marble pillars and arches. In the northern gallery would be placed the manuals, with the great, swell, and pedal organs, and in the southern gallery the choir organ and other stops, with space for a supplementary orchestra. The organ area on north side is 800 ft. superficial, and on south side 600 ft.

The chapter-house (with muniment-room under) is placed at the south-east angle of choir, separated from the choir by a vestibule. The vestries for the bishop and clergy, and also the choir vestries and sacristy, are arranged on the south side, and vestries for churchwardens and vergers are on the north side, all within easy access from the choir aisles. The western open porch is shown to extend the full width of the nave. There are porches at west end of each aisle, also at junctions of aisles and transepts, and the one near the east end to the chapter-house would be used for easy access to the morning chapel. Separate entrances are provided for the clergy and choir. The western porch is approached by a carriage-drive of easy gradient, and which is continued as far as the chapter-house and bishop's entrance, passing through arches in the tower buttresses. A walk for pedestrians is also provided at a lower level, as shown. A covered way and steps are provided from St. James's-road, opposite the transept porch, with open archways across the carriage-drive and lower terrace walk. The portion of the cemetery grounds, coloured blue on the site plan, provided with the instructions is not required in this scheme, and the present road and entrances would remain. Some amount of excavation in front of the cathedral steps at the west end would be required. The church floor-line is 6 ft. higher than the proposed level at foot of steps, and 12½ ft. above the bench mark on cemetery wall at angle near the mortuary-chapel. The site generally would require to be lowered about 4 ft.

A cloister, with a walled-in garden, is provided in connexion with the chapter house, and which would actually face south.

The sculptured figures adjoining the western porch arches would represent the Twelve Apostles, and the upper panels would contain sculptures of the Miracles of our Blessed Lord. The figures on each side of the west window might be from the Prophets, and the gable central figure would be the patron saint of the cathedral. Other sculpture in niches, &c., would require to be determined in detail.

A peal of bells might be placed in one tower, and a single very large bell in the other.

The roof and dome are to a great extent constructed of steel, the dome as well as its flèche being covered with copper. The nave and choir roofs are designed so as to reduce any extreme height in the roofs caused by the width of the building, and the transept roofs are of low pitch, to allow of the great north and south windows of the lantern.

The stone proposed is the yellow and pink freestone from Darley Dale, in Derbyshire, and possibly flecked Runcorn stone would give an effective interior. These are all good bearing stones. Devon marble might be used for the organ galleries and choir and sanctuary screens, the reredos being for the most part of Pavonazzo marble.

The heating-chamber is placed under the north tower and transept, with a sloping approach for coal-carts, &c. The system proposed is by means of steam calorifiers and low-pressure hot-water pipes and coils, arrangements being made in clear-stories and lantern for an upper system of pipes.

The abutments of the central lantern are so planned that either the choir or nave, with the transepts and lower portions of the lantern towers, could be built at any one time separately."

COMPETITIONS.

LIVERPOOL CATHEDRAL.—A meeting of the General Committee of Liverpool Cathedral was held on the 12th inst. at the Church House, Liverpool, to receive the report of the Executive Committee. Lord Derby presided. Mr. R. A. Hampson read the Report of the Executive Committee, which stated that the Committee had approved of the selection made by their advisers, and had appointed Mr. Bodley, R.A., and Mr. G. Gilbert Scott the joint architects for the new cathedral, thus securing the experience of the greatest modern exponent of Gothic architecture and the brilliant talent of Mr. Scott, so conspicuously displayed in his drawings. The Building Committee had instructed their architects to prepare the plans for the new cathedral with such modifications as they might think desirable; also to provide a morning chapel to seat 300, a chapter-house, and more commodious vestries. They had also been requested to submit plans for the foundations for the chancel by October 1 next, which the Committee trusted might enable them to arrange to have the foundation-stone laid during the spring of next year. The principal dimensions of the cathedral, taken from Mr. Scott's drawings, were as follows:—Total length over all, 450 ft.; total length of nave, 224 ft.; total width of nave between the piers, 50 ft.; total length across transepts, 198 ft.; total height of nave vaulting, 116 ft.; total width of north façade, 196 ft.;

LIVERPOOL CATHEDRAL.

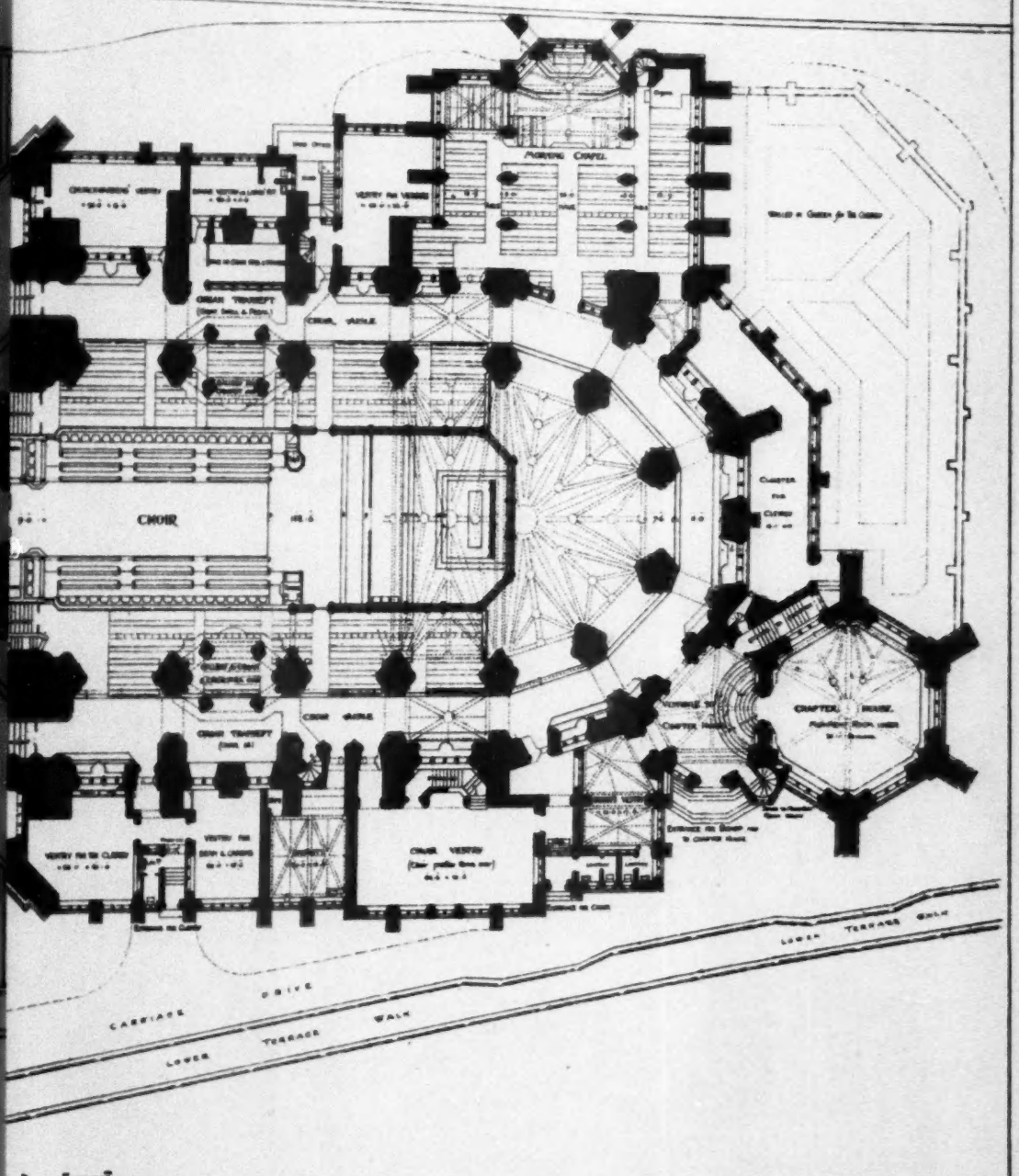
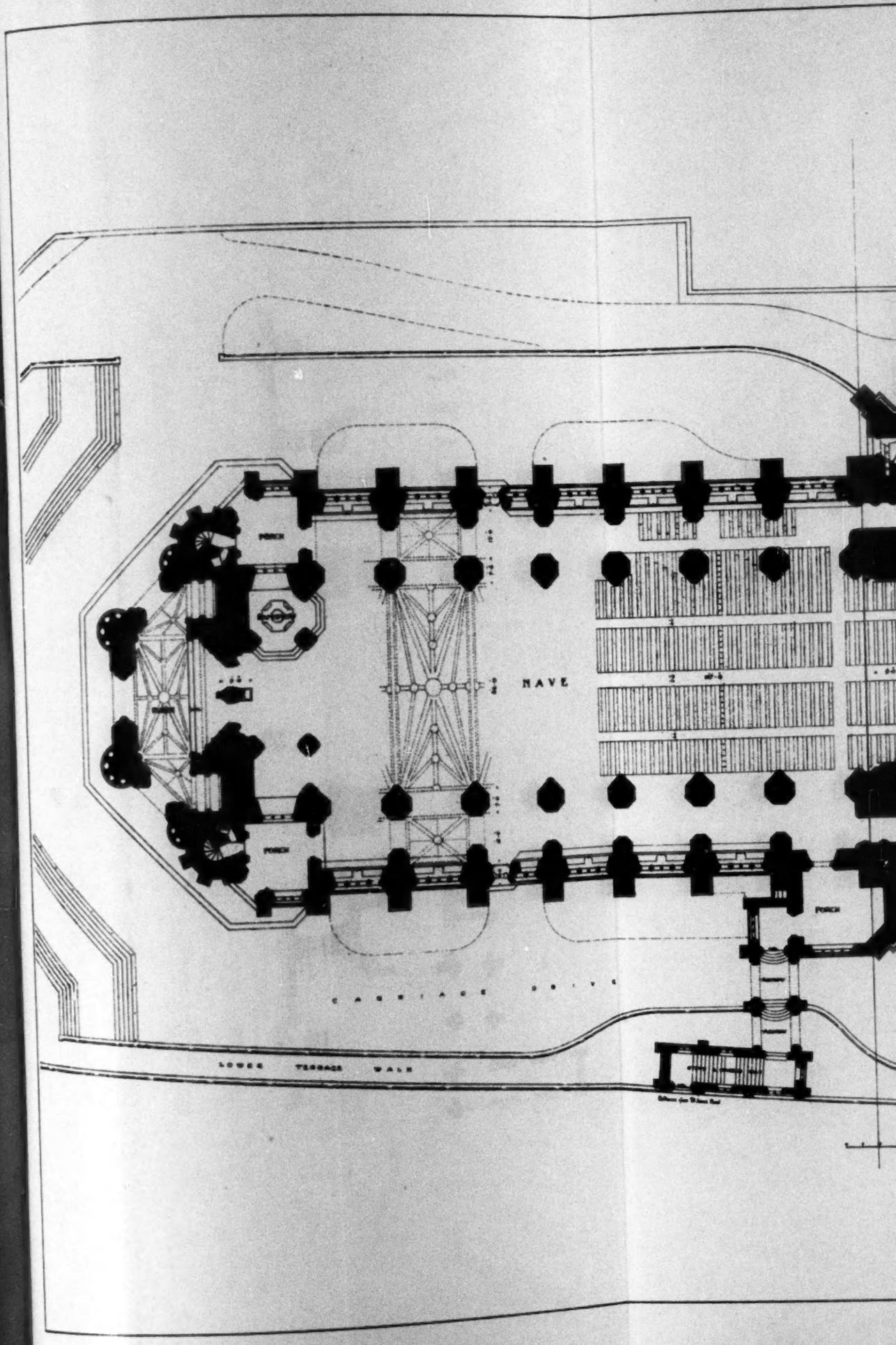


PHOTO-LITHO. SPRAGUE & Co LTD 4 & 5, EASY HARDING STREET, FETTER LANE, E.C.

AUSTIN & PALEY.



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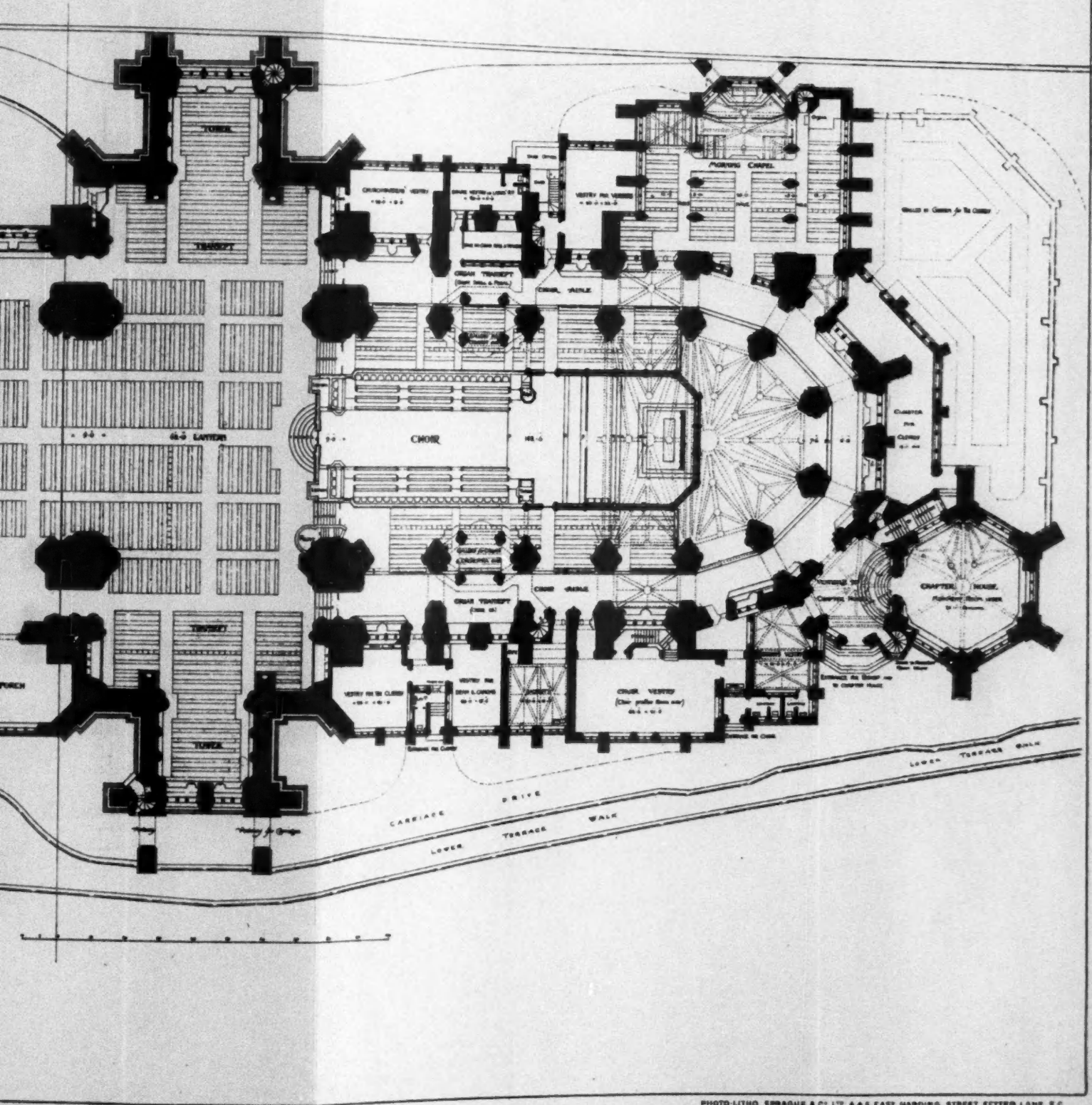
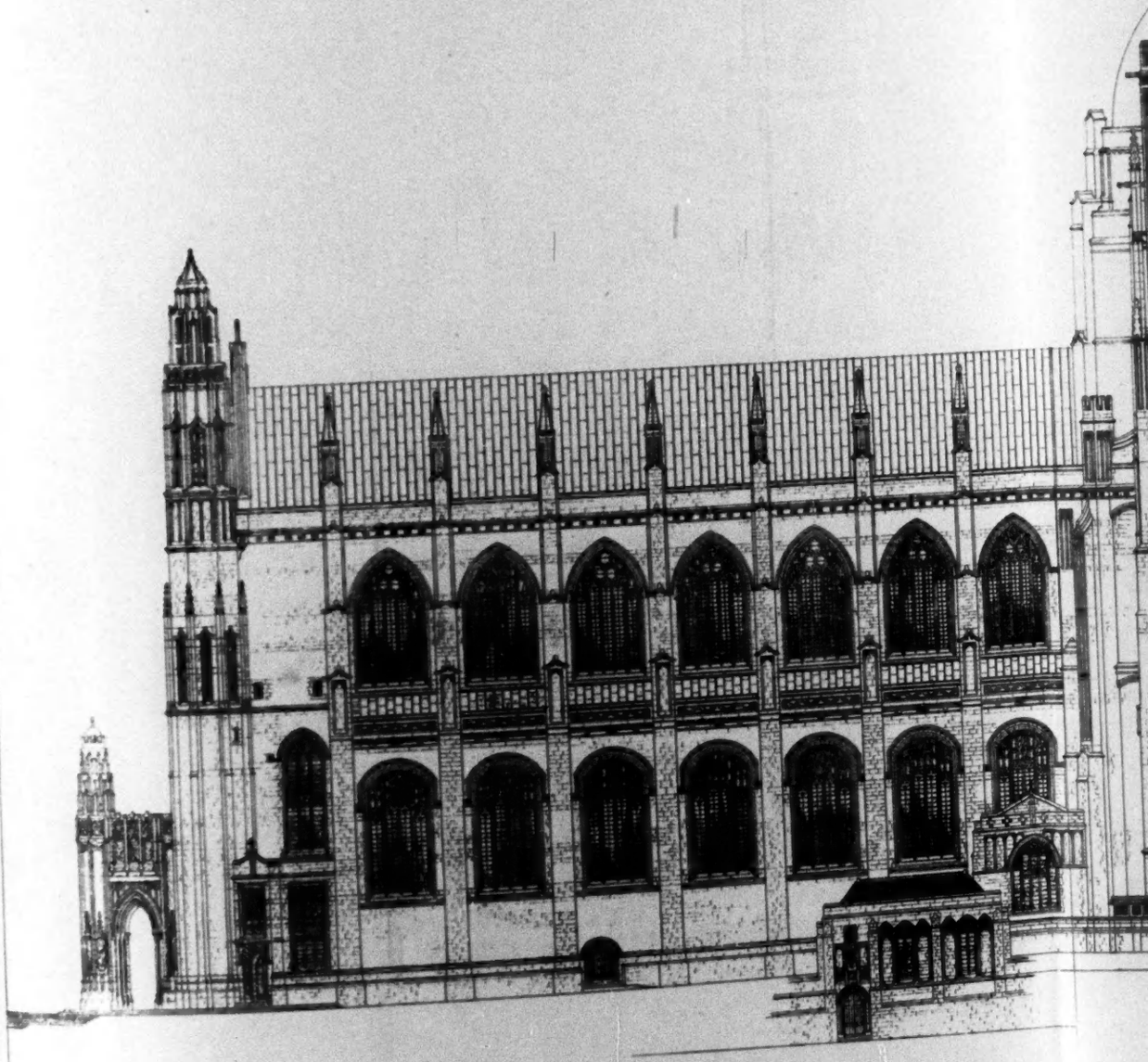


PHOTO-LITHO. SPRAGUE & Co LTD 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

L COMPETITION.—DESIGN BY MESSRS. AUSTIN & PALEY.

LIVERPOOL CATHEDRAL.



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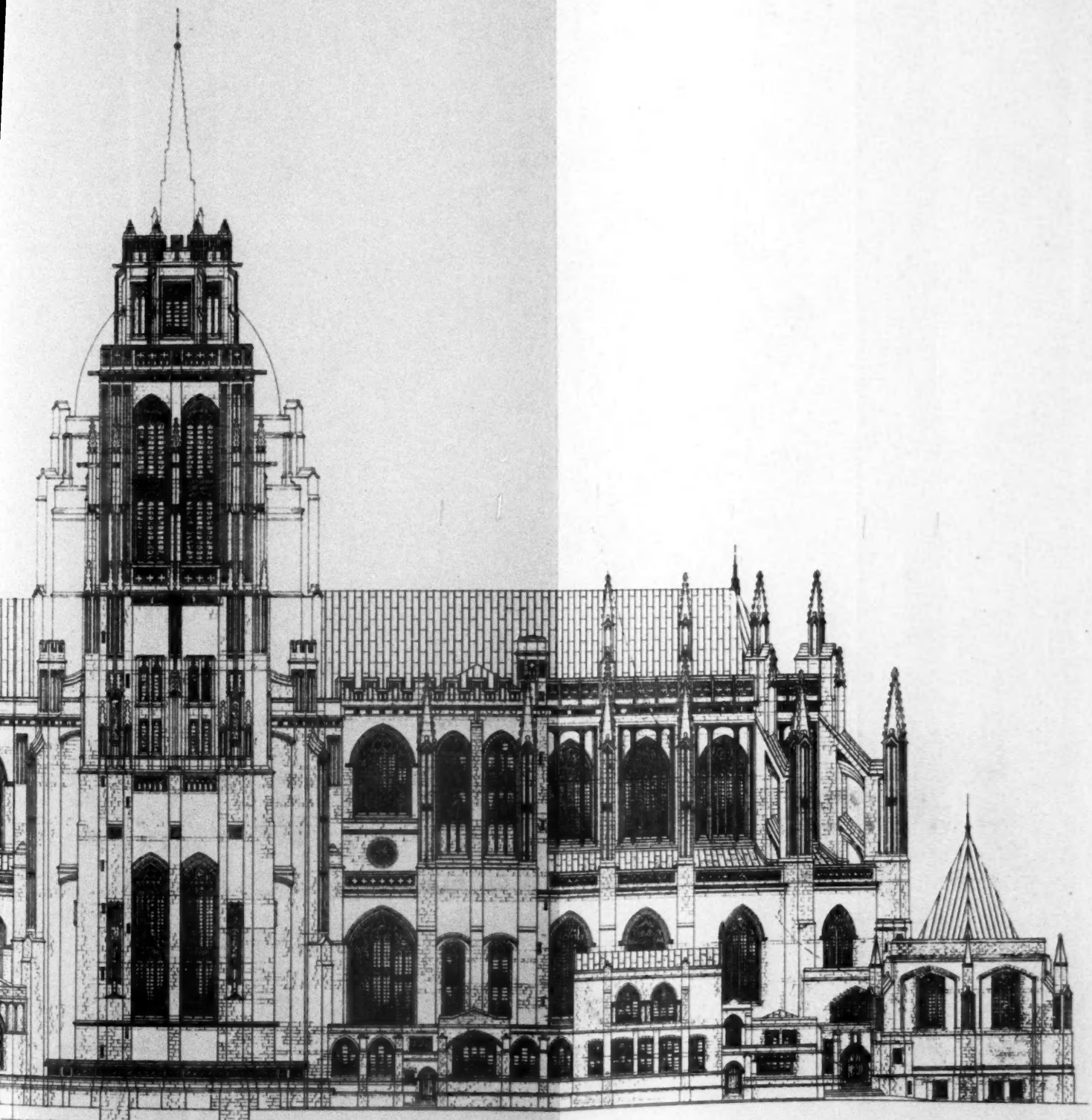
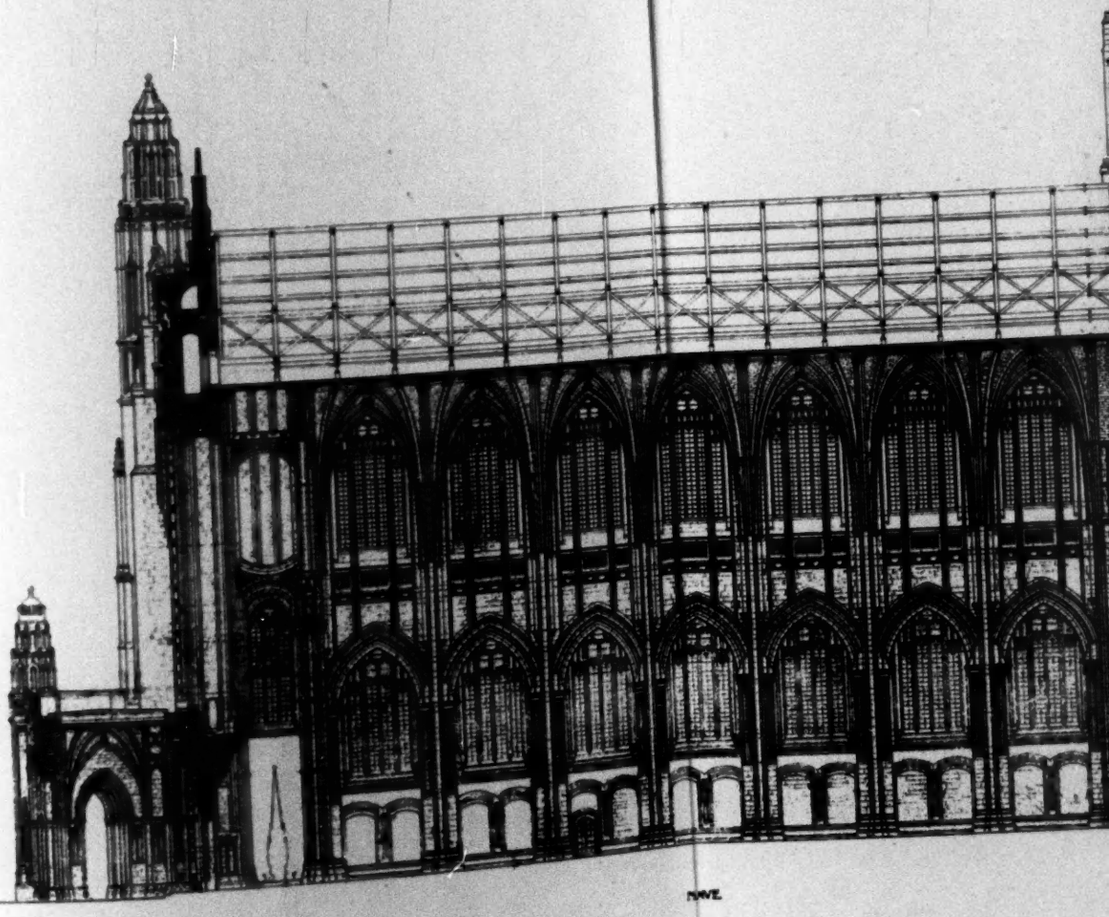


Elevation to St James Road

PHOTO-LITHO. SPRAGUE & Co LTD 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

AL COMPETITION.—Design by Messrs. Austin & Paley.

LIVERPOOL CATHEDRAL



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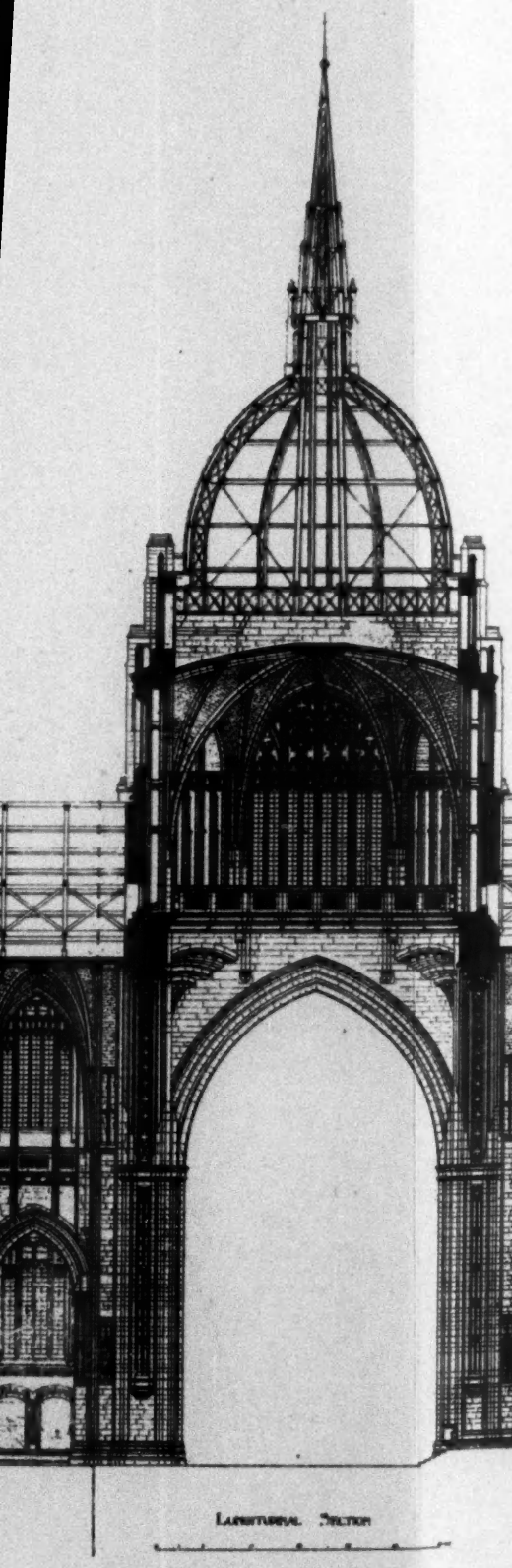
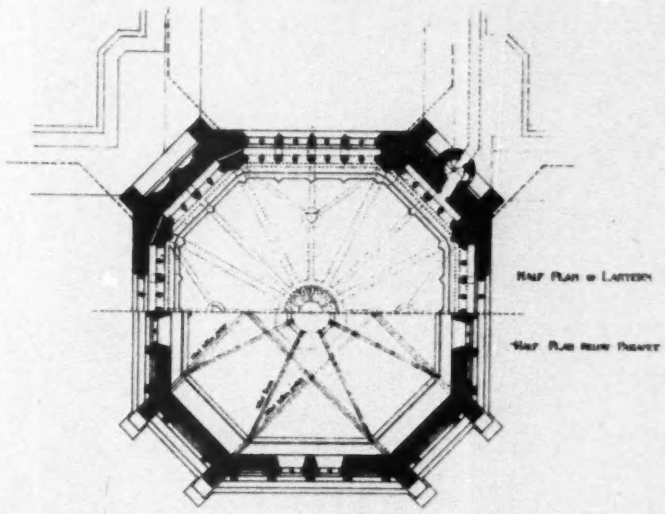
LIVERPOOL CATHEDRAL COM





HALF PLAN OF LANTERN

HALF PLAN BELOW PARAPET

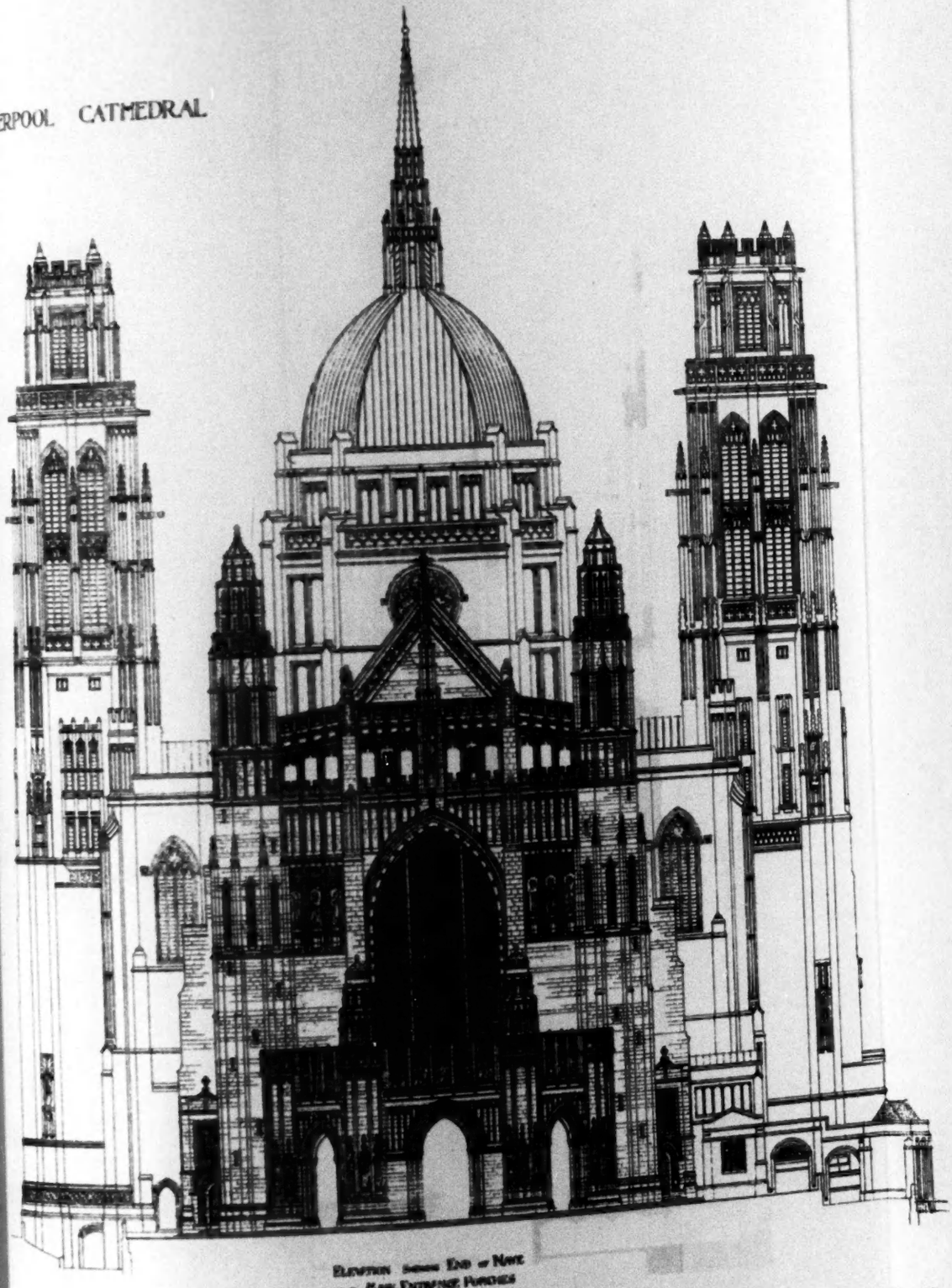
LONGITUDINAL SECTION

CHOIR

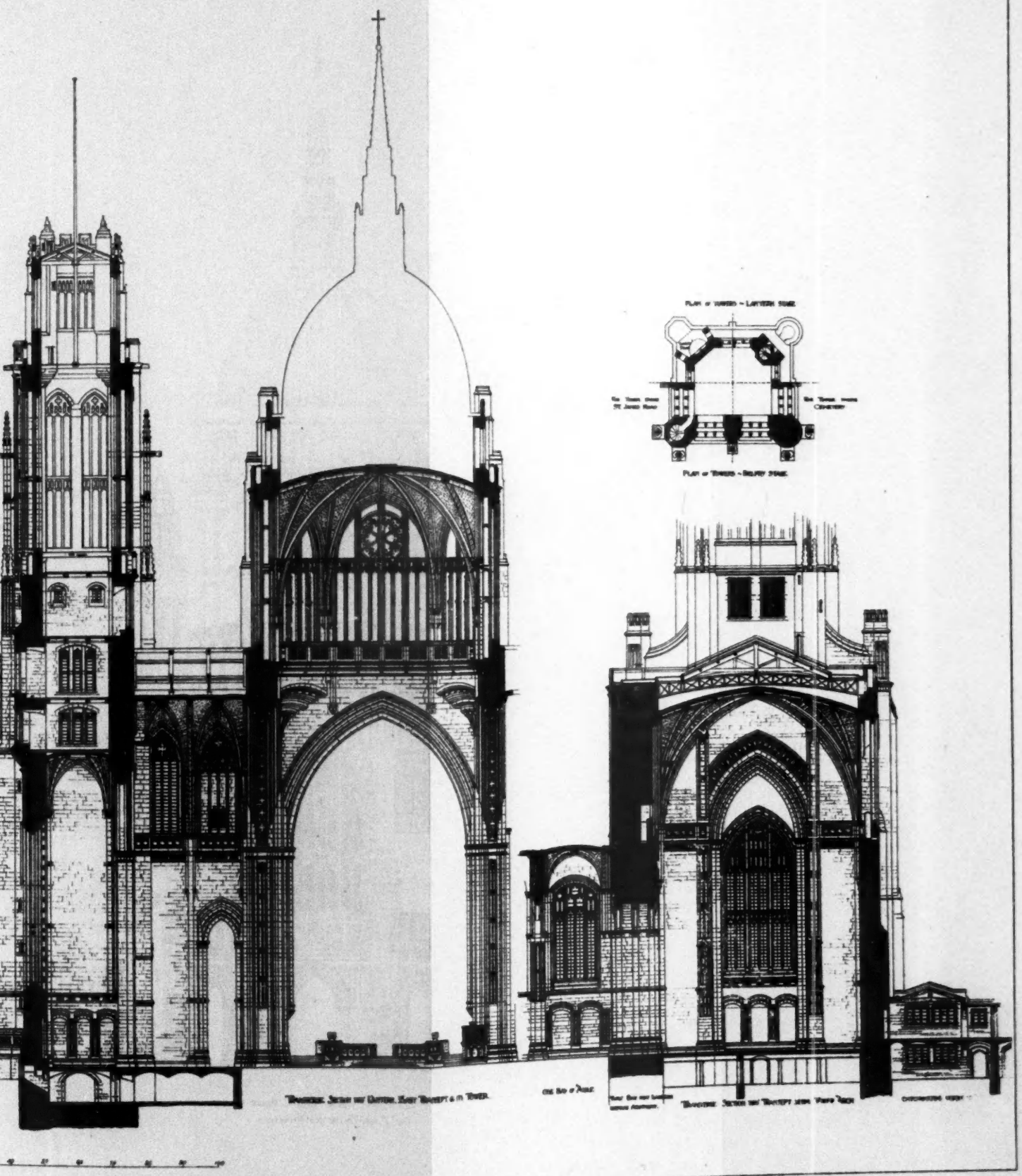
PHOTO-LITHO. SPRAGUE & Cº LTº 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

L COMPETITION.—DESIGN BY MESSRS. AUSTIN & PALEY.

LIVERPOOL CATHEDRAL



ELEVATION SHOWING END OF NAVE AND MAIN ENTRANCE PORCHES



PETITION.—DESIGN BY MESSRS. AUSTIN & PALEY.

PHOTO-LITHO. SPRAGUE & Co LTD 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

total height of towers, 260 ft.—The Bishop of Liverpool seconded the resolution. The edifice would be placed on one of the highest and most picturesque sites of the city, and would be a landmark for many miles around.—The resolution was adopted.—In reply to the Rev. Dr. Porter, Sir William Forwood said Sir William Emerson's plans, prepared sixteen years ago, were for the site occupied by St. John's Church adjoining St. George's Hall. It was a classical design which the Committee thought would be wholly unsuited for the site now selected. In the new cathedral room would be provided for 3,000 persons to see and hear, and a much larger number could be accommodated for a ceremonial purpose.

TOWN HALL EXTENSION, HULL.—The first premiated design in this competition was sent in by Messrs. S. B. Russell, Cooper & Davis, & C. E. Mallows, 11, Gray's Inn-square, W.C. The second premiated design was by Messrs. Treadwell & Martin, 2, Waterloo-place, Pall Mall, S.W.; and the third by Mr. A. Bramwell Thomas, 5, Queen Anne's-gate, Westminster, S.W.

ARCHITECTURAL SOCIETIES.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—The first summer excursion of this Society took place on Saturday, the 13th inst., when the members visited the new St. Anne's (R.C.) Cathedral now in course of erection in Cookridge-street, Leeds. The visitors were met and conducted over the works by the architect, Mr. J. H. Eastwood, to whom a vote of thanks was accorded on the motion of Mr. Butler Wilson, President of the Society. The members then inspected additions to Messrs. Spark & Son's Printing Works, where a new system of fireproof flooring, known as the "Fram," has been introduced into Leeds by the architects, Messrs. Butler Wilson & Oglesby. The party afterwards journeyed to Seacroft, where a new Infectious Diseases Hospital is in progress from the Designs of Mr. Edwin T. Hall.

Correspondence.

A SUGGESTION FOR THE INSTITUTE OF ARCHITECTS.

SIR,—On Monday next will take place the sixteenth general meeting of the Royal Institute of British Architects for this session, when the gold medal will be presented. On Tuesday occurs the annual dinner, and on Wednesday a meeting of the presidents of the eighteen allied societies by invitation of the President of the Institute. These facts have suggested to me the establishment of an annual R.I.B.A. week (in London and elsewhere as might be determined), as is the custom obtaining with other institutions.

A special week of this nature could be made a distinct benefit and attraction to members of the Institute. Promoters of special exhibitions, dealing with matters connected with architecture and the kindred arts, would quickly find it to their interest to make their displays coincide as to time and place with such an event. No doubt, further proposals may accrue, but for the nonce a rough programme suggests itself to my mind:—

Monday.—Exhibition of Prize Drawings. Visits to Exhibitions and Displays of Handicraft, Materials, &c. General Meeting. Presentation of Gold Medal.

Tuesday.—Visit to Buildings completed or in course of erection. President's At-home.

Wednesday.—Meeting of Presidents of Allied Societies with President of the Institute. Special Papers and Discussions. Annual Dinner.

Thursday and Friday.—Excursions to Places of Interest.

BUTLER WILSON,
President, Leeds and Yorkshire Architectural Society.

THE LIVERPOOL CATHEDRAL PLANS.

SIR,—Mr. Tapper, in his report printed in your last number, says:—"Most careful consideration has been given to the question of a central vaulted space, but it is obvious from the fact that the area underneath the dome of St. Paul's Cathedral, 110 ft. diameter, only accommodates some 1,250 people, anything in the nature of a vaulted space with a floor area capable of accommodating more than twice that number is unpractical from an artistic and constructional point of view."

Taking the area of Mr. Tapper's nave and dividing it by 3.000, the required accommodation gives not quite 7 ft. super per head. The space under the dome of St. Paul's at this allowance gives nearer 1,800 than the 1,250 Mr. Tapper mentions, practically 50 per cent. more. But the dome is not all the church. The transepts and the western portion alone of the nave are capable of seating 1,200, so that St. Paul's seats, within reach of the pulpit, the number Mr. Tapper says is unpractical.

If the pulpit was brought forward some 20 ft., all in the transepts, as well as those in the nave, could see it; no one would be farther away than in Mr. Tapper's plan, and St. Paul's would have the great advantage of having very few of the congregation behind the pulpit, against the half in Mr. Tapper's plan.

The simple paralellogram is seen all at once, and lacks the mystery of the cross plan. Transepts with the pulpit at the crossing have also the advantage of grouping the congregation nearer the preacher, and if the angles are cut off, as at St. Paul's and Ely, we have the nucleus of the best type of plan that has been produced as yet.

W. J. H. LEVERTON.

THE TERM REBATE OR RABBET.

SIR,—In Parker's "Glossary of Terms used in Grecian, Roman, Italian, and Gothic Architecture," fourth edition, 1845, the following quotations are given under "Rebate, Rabbet":—"Et solvit Willielmo Blyth pro *le rabytyng* et factura staykfaldhollis, et replecione eorundem, ijs. ijd." Comp. Pr. de Fynkhall, 1488-9. Priory of Finchale, p. cccIxxxiii.; and "The mendyng of the *rabetts* of the windowes." Reparacions done within the Kynge Towr. of London, *temp.* Hen. VIII. Bayley's Hist. of the Tower, App. vol. i., p. xviij. [1st edit.]

D. M.

*** The quotations are interesting, but quotations of that date prove nothing as to proper spelling, as there was no rule whatever about spelling; otherwise we might take it as a proof that "reparacion" was correct. We feel quite sure that "rebate" is the truly constructed and derived word for modern English.—ED.

"ARCHITECTURE AT THE ROYAL ACADEMY."

SIR,—In the otherwise excellent review of the architecture at the Royal Academy your critic last week surely exaggerates a little when, in referring to Design No. 1,513, he says, "both dining-room and kitchen have a south-west aspect—exactly the *worst* they could have, and that the kitchen window is in a corner of the room on the opposite side from the fireplace." That is to say, the best possible aspect for a dining-room is the north-west. Surely a dining-room that has the sun soon after nine o'clock till sunset cannot have much the matter with it? As to the aspect of the kitchen, I am not one of those architects who believe that, where the kitchen is used also as a living-room by the servants, they require no sun. Your critic also omits to state that there is a second window to kitchen in the wall on the left of fireplace, giving it a left-hand light.

W. J. DAVIES.

*** We must apologise to our correspondent as to the fire-place light for the kitchen; we see there is one, but the plan is so very small it escaped our notice. As to the rest we fear Mr. Davies's letter is only another example of the entire ignorance of many architects as to the very meaning of considerations of aspect. To place a kitchen, which must have a fire even in hot summer weather, facing the sun, is simply cruelty to the servants. In a dining-room the direct south sun at luncheon time, and still more the direct and level west sun at dinner time (in summer), is a most serious inconvenience and discomfort in the use of the room. A dining-room aspect should be eastward or toward the east, so as to get the morning sun into it, and have no direct sun into it at meal times. If Mr. Davies ever sits down to dinner on a summer evening in a dining-room facing west he will find this out. His letter shows that he has never thought about it at all. His little drawing is charming; but plan comes before drawing.—ED.

METROPOLITAN ASYLUMS BOARD.

THE ordinary fortnightly meeting of the Managers of the Metropolitan Asylum District was held at the offices, Victoria Embankment, on Saturday, Sir R. M. Hensley in the chair.

Among a number of letters received from the Local Government Board was one requesting that the Managers would reconsider their proposals regarding the erection of sanitary annexes at Caterham Asylum, with a view to a reduction being made in the cost of the work. Another letter from the same Authority enclosed copies of an order authorising the Managers to expend an additional sum, not exceeding 243*l.*, in connexion with the alteration to the Caterham Asylum laundry, and an additional sum, not exceeding 40*l.*, in the erection of a gate, porter's lodge, and other works at the Northern Hospital.

Mr. Helby moved that the following resolution passed by the Board on March 7 last be rescinded:—"That the Board hereby approve the steps being taken for pulling down the wood structures at the North-Eastern Hospital and for completing the construction of the hospital in permanent materials, and that the whole matter be referred to the Works Committee with instructions to prepare a scheme for the consideration of the Hospitals Committee."

Mr. Helby said that the resolution was carried without anything having been said as to the cost. He was strongly of opinion that all schemes of that character, when brought before the Board should be accompanied by the approximate cost. In this case a sum of 150,000*l.* had been voted away without the slightest comment. In the Hospitals Committee's Report the only reason given for that expenditure was the risk of fire. As had been pointed out on several occasions, the risk involved at the temporary fever hospitals was but small. The only justification for such expeuditure was that it would provide additional permanent accommodation, and as to that he contended that the present permanent accommodation was ample.

On a division Mr. Helby's motion was lost by 28 votes to 21.

The Works Committee reported that they had accepted the following tenders:—For the rebuilding of a portion of the boundary wall of the Grove Hospital—Mr. J. C. Mason, Camberwell, 146*l.* 12*s.* 6*d.* For the provision of an underground tank to hold 15,000 gallons of water at the High Wood School—Messrs. McCormick & Sons, 490*l.* The Committee reported that they had instructed the Engineer to prepare plans of the proposed alterations and additions to Southfield House, Joyce Green, with a view of converting it into a residence for the Medical Superintendent of the Joyce Green Hospital. They submitted the plans, and recommended that the Managers approve of the proposed repairs, alterations, and additions to Southfield House, Joyce Green, at an estimated cost of 485*l.*, and that the plan prepared by the Engineer to the Board showing the alterations and additions be forwarded to the Local Government Board for their formal sanction under seal.

This was agreed to.

The Committee further reported that the Engineer had reconsidered the plans, prepared by the late Surveyor, of the proposed cottages for married attendants at Leavesden Asylum. The original estimate for their erection was 5,210*l.*, but the lowest tender received was nearly 2,000*l.* above that estimate and considerably in excess of the amount sanctioned by the Local Government Board. As amended, the plans show the cottages face to face, and in order still further to reduce the cost the drainage from them will be carried into the asylum drainage system. It was agreed on the Committee's recommendation to approve the plans. The revised estimate is 5,950*l.*

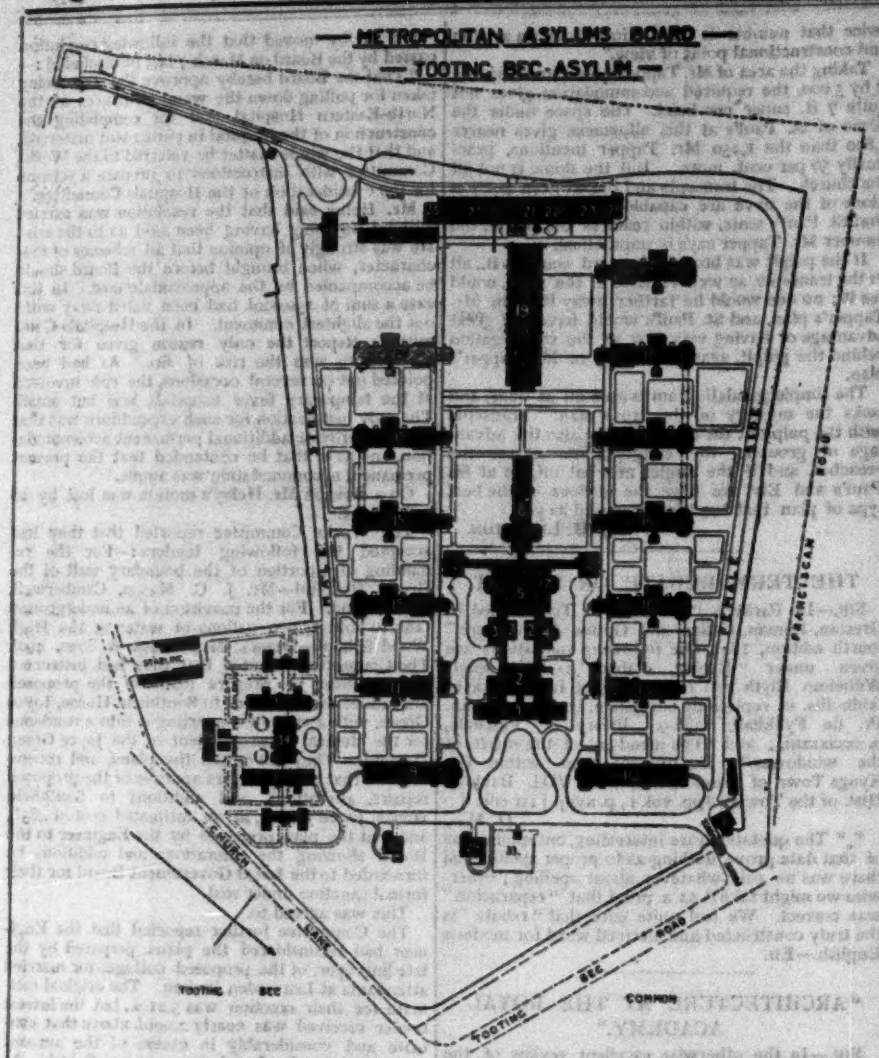
The Asylums Committee recommended, and it was agreed, "That authority be given for the employment of labour and the purchase of materials for the renewal, at an estimated cost of not more than 120*l.*, of two beds of gas retorts and furnaces at the Darenth Asylum gasworks, under the supervision of the Asylum Engineer." At a previous meeting of the Board it was decided to obtain tenders for the work on estimates prepared by the Engineer, but the lowest tender sent in was considered to be excessive.

The tender of Messrs. Rosser & Russell, Ltd., 22, Charing Cross, S.W. (1,689*l.*), for the fixing of fire hydrants, &c., at the Leavesden Asylum was accepted, and a further tender of 1,611*l.* for the fixing of hydrants at Caterham Asylum was also agreed to.

The following tender was accepted for the construction of surface-water drains at the Joyce Green Hospital in accordance with the plans and specification of Messrs. A. & C. Harston, architects. The architects' revised estimate was 962*l.*:—Alex. Wilson, 4, Vulcan-road, Brockley, S.E., 665*l.* 11*s.*

The following tender was also accepted for repointing certain brickwork at the Park Hospital:—T. Robinson, 14, St. George-square, Regent's Park, 276*l.* 12*s.* 5*d.*

The Hospitals Committee reported upon the letter from the Local Government Board, in which that body stated that they were not prepared to sanction the proposal of the Managers to provide additional accommodation for ambulance nurses at the South-Eastern Ambulance Station, on the ground, apart from any other, that the cost appeared to be altogether disproportionate to the amount of accommodation which would be obtained, and they further asked the Managers to consider whether it was necessary to provide at the ambulance stations an amount of accommodation of this kind, based on exceptional experience such as the recent epidemic of smallpox. The Managers had agreed that the accommodation was necessary, and on the question of cost they now pointed out that the accommodation given would consist of eight nurses' bedrooms, two cubicles for female servants, a messroom and chargeroom for nurses, lockers for nurses, together with bathroom and lavatory accommodation for both nurses and female servants. The estimated cost was 2,950*l.*, and the provision of the fresh accommodation necessitated a good deal of work which would otherwise be unnecessary, including



Block Plan of the New Asylum, Tooting Bec.

Reference.

1. Offices and Staff Quarters.
2. Stores.
3. Dispensary.
4. Needle-room.
5. Kitchen.
6. Attendants' Mess-rooms.
7. Nurses' Mess-rooms.
8. Domestics' Block.
9. Attendants' Block.
10. Nurses' Block.
11. Males' Probation Block.
12. Males' Receiving-rooms.
13. Females' Probation Block.
14. Females' Receiving-rooms.
15. Male Patients' Blocks.
15A. Male Patients' Future Extension.
16. Female Patients' Blocks.
16A. Female Patients' Future Extension.
17. Visitors' Rooms.
18. Attendants' Rooms.
19. Laundry.
20. Gashouse.
21. Boiler-house.
22. Dynamo-house.
23. Coals.
24. Disinfector-house.
25. Workshops.
26. Mortuary.
27. Weighbridge.
28. Meter-house.
29. Steward's House.
30. Foreman of Works' House.
31. Porter's Lodge.
32. Greenhouse.
33. Rain-water Reservoir.

Receiving Home for Children.

34. Staff.
35. Imbecile Blocks.
36. Ringworm.
37. Ophthalmia.
38. Isolation Block.

new piers in the basement, girders to carry the projecting chimney rests, &c. Having regard to all the circumstances the Committee did not consider the Architect's estimate of 2,950*l.* was excessive. They recommended accordingly, and also recommended that a copy of the Report be sent to the Local Government Board. This was agreed to.

THE NEW ASYLUM, TOOTING BEC.

THE accompanying small block plan shows the general arrangement of the several buildings. The asylum forms the principal feature with its central group of administrative buildings, male wards to the left, and female wards to the right. The entrance is from Tooting Bec Common, but there is a second entrance from Church-lane, for bringing in coal and heavy stores and removing refuse, for which purpose a granite tram-road has been laid through the workshop yard to the several coal-stores, and a weighbridge fixed.

The asylum has been designed to afford accommodation for 996 patients, but, for the present, two blocks have been omitted, reducing the number to 804. Staff accommodation has been provided for seventy men and 105 women. The infirmary blocks are three-story buildings, and on each floor there is a dormitory for twenty-four beds, and smaller dormitory for six beds, and two single rooms. The dormitories provide for each patient a lineal wall space of 6 ft., a floor area of 72 ft., and a cubic space of 936 ft. At the further end of, and separated from the main dormitory by a dwarf partition, is a large dayroom. Each floor is self-contained and separately approached from the staircase. It forms, in fact, a flat for thirty-two patients. At the entrance end are two single rooms, linen and day clothing rooms, broom recess, bathroom, and ward kitchen, with inspection window overlooking the large ward. The sanitary annexe is near the centre of the east side of the ward, and connected by covered bridges with cross ventilation. The staircases are formed of concrete with steps 5 ft. wide, in short, straight flights, encircling a brick centre shaft, which contains a hand-power lift for raising coals, &c. At the rear ends the blocks are coupled on the first and second floors by means of bridges formed of concrete and steel, which afford a ready means of escape in case of fire, and in suitable weather serve as ambulatories for the use of patients. On each floor of the staircase is an enclosed recess for the dirty linen basket, opening direct to the external air.

The floors throughout are of concrete and steel construction, without voids of any kind, and the spaces below the ground floors have been solidly filled in. The ward floors are finished with polished oak, with terrazzo margins and curved skirtings. Other floors are finished with terrazzo. The walls are plastered with Barrow selenitic cement and have curved internal angles. The large dormitories are warmed by Hendry & Pattison's central air-chambered stoves with descending flues, and the dayrooms and small dormitories by similar side stoves. In addition, there are hot-water radiating coils and radiators in the smaller rooms and offices. The windows have double-hung sashes and fan sashes with glazed hopper cheeks, and below each ward window is a grating with a valve for the admission of fresh air at a point at which it will impinge upon the hot-water coils. In the smaller rooms the air is admitted to the base of the radiators.

The probation blocks are somewhat similar to the infirmary blocks, but provide on each floor day and night accommodation for twenty patients only. A receiving-room adjoins each of these blocks. Two of the single rooms in each block have been padded by Pocock Bros.

The central group are administrative buildings, and the front portion contains the offices and quarters of the chief officers and the committee-room.

The kitchen is 43 ft. by 32 ft.; scullery, 43 ft. by 22 ft., with vegetable washing-room, cooks' store, larder, &c. Both kitchen and scullery are lit by windows on three sides and by lantern lights, the floors are paved with silex stone, and the walls lined with opalite. They are fitted with steam-jacketed boiling pans in central groups, beef tea and milk pans, steam ovens, gas ovens, hot plates and grillers, and a bakers' oven for pastry. The contract for these fittings was undertaken by Messrs. Moorwood, Sons, & Co., Ltd., and Messrs. H. Smith & Son built the oven.

The arrangement of the laundry is a new departure initiated by the Managers. It has been customary hitherto to divide the asylum laundries into four separate departments, each practically a complete laundry for male and female patients, and male and female staff respectively. This, of course, involved expense in building, and rendered supervision difficult. Acting upon the Managers' instructions the architects have much simplified this building, and it now has but one washhouse and one ironing-room for the whole of the work. There are separate receiving-rooms and packing-rooms for staff and patients, a steeping-room for foul linen, and four drying-closets. The laundry has been fitted up with the most modern and approved machinery and fittings under the supervision of Mr. W. T. Hatch, M.I.M.E., Engineer to the Board. It is electric driven, and the drying-rooms are fitted with horses, the drying being effected by hot air on the Plenum system. The contractors for this work were Messrs. Entwisle & Gass, of Bolton.

The mortuary is near the back entrance, and consists of a dead-house, fitted with a cabinet; a friends' room, post-mortem-room, and pathological-room. A disinfector-room is being built at the west end of the boiler-house block, and will be fitted with a Lyon's steam disinfector, with vacuum apparatus. At the rear of the laundry is the boiler-house, with steam coal store, gashouse, dynamo-house, and cellroom, and in continuation of the same block two large stores for house coal in immediate connexion with the side covered ways. All these buildings open into an enclosed workshop yard.

The buildings generally are built of stock bricks, faced with Lawrence's red bricks with blue Staffordshire plinths, and they are covered with Bangor slates. The boundary-walls are built with pressed Leicester red bricks and blue Staffordshire plinths and capping. Next Tooting Bec Common the land is enclosed by a wrought-iron fence, 8 ft. 6 in. high, supported by cast standards. The corridors have concrete flat roofs covered with asphalt, the covered ways have glass roofs, on Rendle's system, carried upon iron columns, and the floors which cover the pipe ducts are of concrete asphalted. The water-supply is from the mains of the Lambeth Water-works Co. For fire purposes, a 6-in. main is run to, and through, the main ducts, forming a ring with 6-in. and 4-in. branches. For the domestic supply, two cast-iron tanks, each upwards of 25,000 gallons capacity, have been erected over the staircases of the two central blocks at a height of 80 ft. These tanks are connected with the fire main, so that in case of a temporary stoppage of the company's supply the water in the tanks will be available, and the pipes are so arranged that one tank may serve the whole building while the other is being cleaned. The rain-water is collected in an underground reservoir of 120,000 gallons capacity situated in front of the main building, this being the lowest part of the site. The reservoir has a wash-out pipe and an overflow to the drainage system, and the water is pumped by an electric pump to the laundry-tank for use in the laundry and as feed-water for the boilers, the pump being controlled by a switch in the boiler-house.

There are three steam boilers of the Galloway type, with Green's economiser and mechanical stoker by the Underfeed Stoker Co., the forced draught for which is furnished by a Sturtevant blower driven by an electric motor. These boilers form the heat centre for the whole building, supplying steam for warming purposes, for heating water, for laundry and kitchen, and steam-supply mains are carried through the several ducts, and the water of condensation is brought back to the hot well next boiler-house, and re-used as feed water. The hot-water pipes and radiators in the several blocks are worked by Royle's calorifiers with automatic control attachments, which regulate the supply of steam to the quantity necessary to maintain a suitable temperature. The hot water for baths, lavatories, sinks, &c., is heated by means of a similar calorifier in the basement of each building, with circulating pipes to the several fittings.

The lighting installation consists of about 2,300 glow lamps of 8 c.-p. or 16 c.-p., and twelve arcs for

lighting the laundry, and has been carried out on a novel principle devised by the consulting engineers. This system, which may be called the draw-through concentric system, consists in running on the surface of the walls, buried in the plaster, small brass pipes varying from 5-16 in. to 7-16 in. internal diameter, and drawing into them a single (or in the case of a three-wire circuit, two) insulated conductors, the pipe serving at the same time as a channel for, and a protection to, the cable, and as the return conductor for the current, one pole being thus connected to, and at the same pressure as the earth, it is impossible to accidentally obtain a shock, and only half the usual amount of wire is required. The lamps are supplied at 120 volts on the three-wire system, and, there being a complete ring main, there are four circuits available for the current, rendering it practically impossible for any breakdown of the main cable to put out more than half the lights at once. Each separate block has its own service box and main switch, by which it can be disconnected at any time from the ring mains, and all the fuses are grouped in distribution fuse-boards in the passages, there being not more than ten lights on a circuit. The electric generating plant marks a new departure in asylum practice, inasmuch as the motive power employed is power gas instead of the more usual steam. The engine-room contains three gas-engines, each giving a maximum of 70 B. H. P. at about 210 revolutions per minute, and driving by belt a shunt-wound dynamo, giving 140 amperes 250 volts, at 550 revolutions. As a general rule two engines only are in use, one being a stand-by. In addition to the three dynamos there is a battery of accumulators, consisting of 132 L. B. 9-Tudor cells, capable of discharging at 56 amperes for ten hours at 240 volts, or in other words of supplying 1,000 16-c.-p. lamps for ten hours.

The boilers and the electric generating plant and wiring were carried out by the undermentioned contractors from designs prepared by Messrs. Handcock & Dykes, and under their supervision:—Boilers, Messrs. H. & T. Danks; generating plant, Messrs. Crompton & Co.; wiring and main cables, Messrs. R. Dawson & Co.

Gas is supplied by the Mitcham and Wimbledon District Gas Light Company for cooking purposes, and for the plate warmers and hot plates in the ward kitchens. The soil and surface-water drainage discharge into the sewers of the Wandsworth Borough Council. The branch drains are disconnected from the main drains, and these in their turn disconnected from the sewer. An electric fire alarm system has been installed with thirty-six call boxes, ten alarm bells, and two indicator boards. There is also telephonic communication between the various departments through an "exchange" at the porter's office. This work was done by Messrs. Julius Sax & Co. Ltd.

Messrs. W. Johnson & Co. carried out the main contract, which included steam mains, hot-water engineering, tanks, &c., together with road-making, and ground work. Their contract amount was 204,523*l.*, but owing to saving effected on the laundry building and in other matters, the work was finished for about 2,000*l.* less. Mr. J. T. Rees acted as clerk of works.

The architects are Messrs. A. and C. Harston.

BOOKS RECEIVED.

ESTIMATING: A METHOD OF PRICING BUILDERS' QUANTITIES FOR COMPETITIVE WORK. By George Stephenson. (B. T. Batsford. 4s. 6d.)

NEWQUAY: THE VALE OF LANHERNE AND PERRANZABULOE. (The Homeland Association. 6d.)

TECHNICAL ARITHMETIC AND GEOMETRY. By C. T. Millis, M.I.Mech.E. (Methuen & Co. 3s. 6d.)

PROCEEDINGS OF THE ONTARIO ASSOCIATION OF ARCHITECTS. Third Annual Volume, 1903.

DOUBLE ENTRY, OR THE PRINCIPLE OF PERFECT BOOK-KEEPING. By Ernest Holah. (Effingham Wilson. 2s.)

GENERAL BUILDING NEWS.

ST. JAMES'S UNITED FREE CHURCH, KILMALCOLM.—The new church which has been erected in Kilmalcolm for the St. James's United Free congregation has just been opened. The church, which is situated on the rising ground in Duchal-road, has been designed by Mr. William Leiper, R.S.A., Glasgow. The general plan is a nave with wide aisles and chancel, and the building is constructed of stone, internally as well as externally. The nave is divided from the aisles by arcades of three bays, the piers and arches being moulded. Above these are clearstory windows filled with tracery. A moulded stone arch divides the chancel from the nave, which has a hammer-beam roof open to the ridge. Accommodation, without galleries, is provided for about 600 sitters. The choir seats and stalls for the elders are in the chancel, and, along with the pulpit, which is at the north pier of the chancel arch, are of teak. The communion-table is in the centre, in front of the stalls. An organ-chamber, with arched openings to the chancel and aisle, is at the south-east, and the vestry is at the opposite side. A feature in the design is a tower, which rises to the height of 120 ft., and is finished with a saddle-back roof and flèche. There is an angle stair turret giving access to the bell-chamber and the parapet over the belfry. A hall and various church offices complete the design. The various contractors are:—Mason, Wm. Steel, Greenock; joiner, James Grant, Glasgow; roof, tiles, &c., Charles Wallace, Paisley; plumber, D. M'Ilwraith; plasterer, Allan Hamilton; carving, James Young and Geo. Gregory; heating, Boyd & Co., Paisley; painting, John Hatrick; floor tiles, Kean & Wardrop; leaded glass, George Hunter; and electric wiring, Kemp & Co., Glasgow. The clerk of works was Mr. James Murray. The organ was built by the firm of Brindley & Foster.

CHURCH, DEAN, EDINBURGH.—A new parish church has just been erected at Dean, Edinburgh. The plans were prepared by Messrs. Dunn & Findlay, architects. There are 935 sittings, about 300 more than in the former church. The estimated cost of the building is 10,800*l.*

PARISH CHURCH, HARTSHORNE, DERBYSHIRE.—Hartshorne Parish Church was reopened recently after being restored and enlarged from the designs prepared by Mr. G. F. Bodley, R.A. The enlargement includes a new chapel vestry, north aisle, east window, and the opening out of the tower. The Dethick monument has been removed to the west door, the floor paved with wood blocks, the aisles laid with York stone, and the church provided with chairs, seating accommodation being afforded for 250. A new pulpit and lectern have been introduced, the organ has been built in the gallery, and choir stalls have been erected opposite the altar. The cost has amounted to 2,600*l.*

ROMAN CATHOLIC PAROCHIAL HALL, GLASNEVIN.—A new Roman Catholic parochial hall has been erected in the grounds of the Chapel of Our Lady of Dolours, Glasnevin. The hall, which will be capable of accommodating about 500 people, has been designed by Mr. T. A. Coleman, of the firm of Messrs. Ashlin & Co., and the contract has been carried out by Mr. D. Daly, builder, of Drumcondra.

METHODIST CHAPEL, ST. GEORGE, BRISTOL.—The foundation-stones of a new Methodist chapel to be erected in Church-road, St. George, were laid recently. The length of the building will be 68 ft., the width 40 ft., and the height inside will be 32 ft. Two main entrances will be provided, and a side entrance to the minister's vestry. The building will be of Pennant stone, with Bath stone dressings, and the inside fittings of the chapel will be polished pitch-pine. A gallery will run all round the interior, and accommodation will be provided for 600 people. Messrs. Howdill & Howdill, of Leeds, are the architects.

NEW TRANSEPT AND ORGAN, CHURCH OF ST. JOHN THE BAPTIST, BELFAST.—A new transept and organ have recently been dedicated at this church. Mr. G. Benson, of Manchester, supplied the organ; Mr. D. M'Henry, of Mosside, Dunmurry, was the general contractor. The improvements have been carried out from the designs of Mr. Close, architect, at a cost of about 700*l.*

METHODIST SCHOOLS, HUCKNALL, NOTTINGHAMSHIRE.—The foundation-stones were laid on the 2nd inst. of new Sunday-schools, to be erected at Hucknall Torkard at a cost of 3,000*l.* The new schools, for which Mr. A. H. Goodall, of Nottingham, prepared the plans, are immediately at the rear of the chapel. Every available foot of land has been utilised to find space for a central hall and classrooms, the chief entrance being from the 9 ft.-roadway on the north side of the chapel, and this will communicate with a church parlour, 31 ft. long by 21 ft. wide, providing accommodation for 120 persons. On the ground floor there will also be an infants' room, 22 ft. by 21 ft., with a gallery for 110 children, three classrooms, kitchen, and lavatories. Two staircases, for boys and girls respectively, will afford access to the assembly hall on the first floor, and this will measure 44 ft. by 36 ft. A gallery on three sides of the hall will contain provision for 200 persons, and with room on the ground floor for 320 the hall will accommodate a total of 520 people. In addition, there will be three classrooms on the east side and two on the south, which, when desired, can be thrown into the hall by removing folding screens, the upper part of which will be glazed. From the gallery five more classrooms will be accessible, and when these ten classrooms are opened out accommodation will be found for 734 adults. In addition, two classrooms will be constructed on the north-east angle of the site, and altogether there will be eighteen classrooms, giving space for 582 scholars. The heating is to be by hot-water pipes and radiators. Mr. J. A. Munks, of Hucknall, is the contractor.

WESLEYAN SCHOOLS, LOUGHBOROUGH.—The memorial-stones were laid recently of the new schools to be erected in connexion with the Wesley chapel (Methodist New Connexion), Woodgate, Loughborough. The plans, prepared by Messrs. Barrowcliff & Allcock comprise a main schoolroom, 33 ft. by 25 ft., at the street end of which are two classrooms, and at the other end a kitchen. The building will be heated with hot water. The contract has been placed in the hands of Messrs. T. Barker & Sons.

RE-OPENING OF RODBOURNE CHURCH, WILTSHIRE.—The Church of the Holy Rood, Rodbourne, has been restored and reopened. The undertaking, under the superintendence of Mr. Brakspear, architect, was commenced in October last, and Messrs. Downing & Rudman, of Chippenham, were the contractors. There is an open timber roof; the north wall was thoroughly repaired, and the south wall and porch were practically rebuilt. A wooden floor has been laid. Originally the chancel floor was lower than that of the nave, but it is now raised, and brought a step above the floor of the nave. The old screen remains, and a curious ancient stone seat, which had many years ago been taken away and found in a farmyard, has been restored to its former place in the chancel.

BLEDLOW CHURCH, BUCKINGHAMSHIRE.—A fund is opened for the restoration, at an estimated cost of 800*l.*, of the tower and belfry of the parish Church of Holy Trinity, Bledlow. About forty years ago 1,400*l.* was expended upon the reparation of the body of the church, which is constructed of flint and stone, and has a chancel, a nave of four bays, and aisles, with a south porch and west tower. The style is mainly Late Norman of the Transitional period, the windows and clearstory being Decorated.

WESLEYAN CHAPEL, BISHOP STORTFORD.—A new Wesleyan chapel has just been completed at Bishop Stortford. The new chapel has been erected from the design of Messrs. Gordon & Gunton, of London, by Mr. Hy. Feast, of Haddenham, at a cost of about 5,500*l.* It is in the Gothic style, and built of red brick, with Bath stone facings, and will hold a congregation of 600. It contains a rostrum and choir stalls, and a space has been reserved for a large organ. A lobby extends the whole width of the building, from the body of which it is separated by a tinted glass screen. At the rear are two vestries. The interior woodwork is of pitch-pine, and the floor is paved with maple wood blocks. The floor of the lobby is paved with mosaic work. There are five windows of cathedral glass on the south, four on the north, and a Gothic window in the east.

METHODIST BUILDINGS, WALLSEND.—The foundation stones of new buildings for the Methodist New Connexion community of Wallsend have just been laid. A site has been procured at a cost of 1,000*l.* for a new church and schools facing Wallsend Park. The new church will have seating accommodation for 500 persons, and will have a small gallery at the west end and transepts. The organ recess is at the east end, and accommodation is provided for a choir of forty. The schools will hold over five hundred children, and will consist of a central hall with eight classrooms off the same. There are also a church parlour and a minister's vestry. The building will be heated by hot water. The church is Gothic in design, and will be treated in red brick with stone dressing and red tiled roof, with tower and spire. Mr. Benjamin F. Simpson, Newcastle, is the architect, and the contract has been let to Mr. W. T. Weir, of Willington Quay. The entire cost will be over 6,500*l.*

WESLEYAN CHURCH, WEST KIRBY, CHESHIRE.—On the 10th inst. the foundation-stones were laid in connexion with the new Wesleyan Church, Westbourne-road, West Kirby. The total cost of the church will be about 3,600*l.* The new church, which has been designed by Messrs. John Wilis & Sons, of Derby and London, will be 58 ft. long by 41 ft. inside, with seating accommodation for 345 adults, or a mixed congregation of 540 persons. The design is Gothic, and the exterior facing will be local rock stone with ashlar dressings round the windows and doorways. The pulpit, seats, and ceiling are of pitch pine. The work of building is being carried out by Mr. Samuel Fowler, Bootle.

CHURCH RESTORATION, BASSALEG, MONMOUTHSHIRE.—The ancient tower of Bassaleg Church has for some months past been undergoing restoration, including new lead flat, new beams and floors, rehanging of bells, opening out of the arch between tower and nave, with the addition of an oak screen; the clock altered and repaired, &c. The church has now been handed over to the contractors for thorough restoration, which will include new roofs inside and out, new glazing of windows, decoration of the interior, new heating apparatus, &c. The work is being carried out by Messrs. S. Shepton & Son, of Cardiff, from designs by, and under the supervision of, Mr. C. B. Fowler, Cardiff.

ST. BARNABAS' NEW CHURCH, ROCK FERRY, CHESHIRE.—The foundation-stone of the new church for St. Barnabas' district, in connexion with the Church of St. Peter, Rock Ferry, was laid on the 11th inst. The new building occupies a position at the corner of Russell-road and Bedford-place, and between New Chester-road and the Mersey. It is to be Gothic in style, 120 ft. long, 50 ft. wide, and 32 ft. in general height from floor to ridge, the height of the belfry-tower at the west end gable rising to 45 ft. It is to be a grey-brick building with terra-cotta dressings and stone interior dressings. A feature of the interior will be pitch-pine roof and seating, with wooden-block flooring. It will include nave and chancel, choir and clergy. It will include nave and chancel, and two side aisles. The vestries, a centre aisle, and two side aisles. The new building will cost between 4,000*l.* and 5,000*l.*, in addition to the site. The architects are Messrs. Grayson & Ould, Liverpool, and the contractor Mr. Richard Allen, of Birkenhead.

CHURCH, GOWNA, IRELAND.—On the 11th inst., at Gowna, Co. Cavan, the foundation-stone was laid of the new church. The new edifice will be capable of accommodating 800 people. The con-

tractor for the building is Mr. Thos. Fee, of Longford, and the architects are Messrs. Hague & M'Namara, Dublin.

SCHOOL BUILDINGS, COSELEY, STAFFORDSHIRE.—The memorial stone has just been laid of the new school for girls, cookery, laundry, and woodwork centres, at Mount Pleasant, Coseley. The new girls' school is for 350 scholars, and is placed with its chief elevation to Mount Pleasant-street. It has a large central hall and seven classrooms, together with cloak-room, lavatory, and other conveniences. The central hall is lighted by clearstory and dormer windows, and the classrooms with arched windows. A central flèche is placed upon the main roof. The block containing the cookery and laundry centres is situated upon the Ivy House-lane side of the site. There will be a room for sixty cookery students, with scullery, cloakroom, and lavatory attached, and another similar room for the accommodation of sixty scholars in the laundry department. This is provided with a drying-room and other requisite appurtenances. Upon the south-east, or boys' side of the site, the centre for the teaching of woodwork is placed. This contains a workshop, with cloak and lavatory accommodation. The existing mixed and infants' school will be converted into a boys' department and infants' department. The materials employed are brick and stone, relieved by moulded brick strings, and pressed arches and quoins. There will be tile roofs, and wood-block and granolithic floors. The interior will have glazed brick dadoes. The ventilators are those of Messrs. Walters, of Wolverhampton, and the low-pressure heating apparatus is being installed by Messrs. Glydon, of Birmingham. The contractor is Mr. Henry Gough, of Wolverhampton, the amount of whose tender is 8,394*l.* The work is being executed from the designs and under the personal superintendence of Mr. S. Henry Eachus, architect, of Wolverhampton.

SCHOOL, ABERFAN.—A new mixed school, to accommodate 350 children, has been erected for the Merthyr School Board at Aberfan, Merthyr Vale. The building occupies the north end of the site, having a frontage of about 130 ft. towards Moy-road, and a depth of 60 ft., the offices being placed along the back boundary wall. The design has been based upon the central hall principle, with all classrooms opening out thereon. The central hall is 50 ft. by 26 ft., and may be divided into two parts by means of a glazed folding partition, each portion being used as a classroom for fifty infants, if necessary. When not so required the hall may be utilised for drill or general assembly purposes. There are six classrooms in addition, two 22 ft. by 23 ft., and four 22 ft. by 24 ft. 8 in., and accommodating fifty infants each, with a large cloakroom at either entrance. There is also a room for the headmistress and the teaching staff, with book store, &c., attached. The works have been carried out by Messrs. E. R. Evans & Bros., contractors, Cardiff (the contract price being 4,467*l.* 13*s.*), from the designs and under the superintendence of the Board's Architect, Mr. J. Llewellin Smith, Mr. Gwilym Jenkins acting as clerk of the works.

BOARD SCHOOLS, YNYSHIR, GLAMORGANSHIRE.—A new school for the Rhondda Board has just been opened at Ynyshir. The school has been built on the mountain side, and the preparation of the site alone cost about 3,000*l.* It has a frontage of 172 ft. The contract price was 11,600*l.*, and the school provides accommodation for 354 girls and 420 infants, including a cookery room for fifty-four pupils. In the basement there is a covered playground 67 ft. long by 24 ft., and the infants' department, which is on the ground floor, comprises seven classrooms, a marching hall, 68 ft. 6 in. by 25 ft., and a cloak-room. On the upper floor, with accommodation for girls, there are seven classrooms, separated by glass partitions, and a marching hall. In all the departments private rooms have been provided for the teachers. The building has been designed by the board's architect, Mr. Jacob Rees, Pentre, who has also superintended the work. The contract was carried out by Messrs. Jenkins & Son, Porth.

SCHOOL, HOLYSTONE, NORTHUMBERLAND.—The foundation-stone of this new school was laid on the 10th inst. The buildings are to be built of red brick with grey slate roof. The school is planned to accommodate 400 children, and comprises both mixed and infants' departments, including a central hall to the Mixed School and a marching corridor for the infants to exercise in. The work is being carried out by Mr. Nichol Ritchie, builder, Whitley, from the designs and under the supervision of Messrs. Oliver, Leeson & Wood, architects, Newcastle-upon-Tyne.

DEVON COUNTY ASYLUM EXTENSIONS.—The following tenders have been received for carrying out further extensions at the Devon County Asylum, Exminster:—Davies, Cardiff, 32,500*l.*; Westcott, Austin, & White, Exeter, 30,799*l.*; Pethick Bros., Plymouth, 36,711*l.*; Blake, Plymouth, 34,183*l.*; Dart, Crediton, 30,877*l.*; Collins & Godfrey, Tewkesbury, 35,726*l.*; Stephens & Sons, Ltd., Exeter, 29,875*l.* 16*s.*; Lapthorn & Co., Plymouth, 32,217*l.*; Wakeham Bros., Plymouth, 33,929*l.*; Coles, Plymouth, 33,416*l.* The tender of Messrs. Stephens & Sons has been accepted.

"TECHNICAL INSTITUTE, RICHMOND."—In reference to the paragraph under this heading which appeared in our last issue, the name of the town was incorrectly given. The new building is situate at Wimbledon, not Richmond.

BANK, GLASGOW.—A new building at the corner of Glassford-street and Trongate, Glasgow, has been erected by the directors of the National Bank of Scotland, Ltd., as a branch office. The ground covered by the new building is about 46 ft. square, and the bank office occupies the whole of the street and basement flats. The upper floors are to be occupied by Messrs. Munroe & Co. The design is treated with horizontal bands of masonry, each angle being marked by corner turrets with a lofty dormer window between, flanked by sculptured figures, and the whole crowned with a steep pyramidal roof having a wrought-iron cresting. The stone has all been obtained from Plean Quarry, and the whole contract has been carried out by Messrs. A. Muir & Son, builders, Nithsdale Drive. The sculpture work was executed by Mr. Birnie Rhind, A.R.S.A., the electrical elevator by the Otis Co., the steel work by Messrs. P. & R. Fleming, the safes by Messrs. Chatwood & Co., and the floors by Mr. Stoffert. The electric installation is by Messrs. W. Bryden & Son, heating by Messrs. Mackenzie & Moncur. The architect was Mr. Thomas P. Marwick, Edinburgh, and the clerk of works Mr. John Currie.

ORPHANAGE, IPSWICH. — The Hope House Orphanage, Ipswich, is to be enlarged from plans prepared by Messrs. Eade & Johns. The contract has been placed in the hands of Mr. C. Roper, Ipswich.

SCHOOL SWIMMING BATHS, BRADFORD.—On the 11th inst. the new swimming-bath, laundry, and cookery-rooms recently built in connexion with the Feversham-street Board School, Leeds-road, Bradford, were opened. The buildings have cost about 6,000*l.* The swimming-bath is 56 ft. long by 18 ft. wide, with dressing-rooms and gallery above. There is also an instructor's room, and a manual training-room, laundry, and cookery-rooms, each of the two latter being 28 ft. long by 34 ft. wide. Mr. Mawson, of Messrs. Mawson & Hudson, was architect.

CONGREGATIONAL CHURCH AND SCHOOL, LITTLE ILFORD. — The tender submitted by Messrs. F. Gough & Co., Hendon, has been accepted. The block comprises church to accommodate about 724 adults, and the usual vestries, &c., also a two-story school, the main hall being on the upper story, and the classrooms and small hall on the ground floor. The buildings are faced externally with red bricks, and the dressings are of white Costessey work. A tower forms a prominent feature at the corner. The contract amounts to 4,435*l.* The architects are Messrs. George Baines & R. Palmer Baines, Clement's Inn, Strand, London, W.C.

OPEN-AIR THEATRE, PORT SUNLIGHT.—On the 13th inst. an open-air theatre was inaugurated by the Mayor of Bolton at Port Sunlight. The permanent building contains a stage 50 ft. by 35 ft., and dressing and other rooms. The auditorium is 158 ft. 6 in. long, by 95 ft. wide, and is formed of concrete, with a large centre area rising gradually to the back, and with stepped galleries all round, the end being octagonal. This area will be covered with benches, which will seat nearly 3,000 people. The audience will be sheltered from the weather and sun by a steel-framed roof carried upon iron columns, over which will be stretched strong waterproof canvas, the sides being closed in with the same material. The ironwork has been supplied by Messrs. E. F. Bleakley & Co., and the builders' work has been carried out by the building department of Messrs. Lever Brothers, from the designs of Messrs. Grayson & Ould, Liverpool.

DURHAM COLLEGE OF SCIENCE, NEWCASTLE.—At a meeting of the Council on Monday last, Mr. W. H. Knowles was appointed architect, and Mr. J. P. Allen, quantity surveyor, in connexion with the completion of the college buildings.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—Mr. Gordon P. G. Hills, architect, has removed his office from 4, Adam-street, Adelphi, to 7, Newcourt, Carey-street, Lincoln's Inn, W.C.——Messrs. E. C. & J. Keay, iron-roof contractors (Birmingham), have appointed Mr. Louis Marshall, of St James's Chambers, 38, Church-street, Sheffield, as their sole agent for the counties of York and Lincoln.——With reference to the notification in our issue of the 13th instant as to Mr. Bertram Blount having removed from No. 2, Broadway, Westminster, to 76 and 78, York-street, Westminster, we are requested by Mr. R. H. Harry Stanger, son of the late Mr. W. Harry Stanger, of the firm of Messrs. Stanger & Blount, to state that he, having succeeded to his father's business, is carrying on the testing works and chemical laboratories at 2, Broadway, Westminster, in his own name.

FOUNTAIN, DARTMOUTH.—At Dartmouth, recently, the Mayoress opened an ornamental fountain on the New Ground. The fountain, as reconstructed and improved, has been designed by the Borough Surveyor (Mr. A. Smith).

ROUMANIAN TIMBER TRADE.—It appears from official returns that the annual value of the exports of timber from Galatz has risen in the short space of three years from 110,000*l.* to 720,000*l.* As far as supply is concerned there would seem to be no reason why the export should not go on increasing, for the Roumanian forests are said at present to comprise 746,688 acres of pine and fir; 1,306,476 of beech, alone or mixed with fir; 1,662,293 of beech, oak, elm, and hornbeam; 1,712,224 of oak, alone or predominant; 244,356 of poplar and other soft white woods; and 29,764 of acacia.

WINDOW GLASS MAKING IN CALIFORNIA.—One of the latest industries to be established in the Western States of America is that of window glass making. A factory has been opened at Stockton which turns out about 45 tons of glass a week. Stockton was apparently selected as the site of the factory on account of its natural position within easy communication by water with San Francisco, plenty of fuel handy, and a specially good quality of sand being found close at hand in the surrounding districts. The Stockton factory (according to an official report made by the English Consul) will probably in the immediate future supply the whole of the glass used on the Pacific slope. To-day it is hardly able to meet all the calls made upon it. The British glass trade, so far as California is concerned, has long since been killed, and the Belgian is being seriously cut into. The labourers work on an eight-hour shift, forty hours constituting a week's work. The blowers are paid from 6 dols. 50 c. a day upwards. The fuel used is oil. Glass blowing is almost a close corporation in America, the men belonging to a union that adjusts its own grievances and gains them higher pay than is received by any other body of working men. It is known as "The Window Glass Workers' Association of America," and is probably the most exclusive on record. Only sons and brothers of glass-blowers are permitted to join, so that a son of a glass-blower with but rare exceptions follows in the footsteps of his father. He usually begins at the age of eighteen to be what is known as a snapper. He works at this a year or more, according to his skill, when he becomes a gatherer. It usually requires three years' experience at this before he can become an expert blower. It is said, however, that the American Window Glass Company have produced a machine which will work with delicacy and turn out three times as much work in a given time as a glass-blower. It is believed that this machine will revolutionise the industry.

COURT OF COMMON COUNCIL.—At the last meeting of the Court of Common Council, Mr. Morton, as Chairman of the Streets Committee, in answer to a question by Mr. Pridmore on the subject of the Building Acts Amendment Bill, said that the Committee had asked for a draft copy of the new Bill which would be discussed at a meeting of the County Council early next month. The Committee would endeavour to arrange a conference with the County Council on the subject as soon as possible afterwards.—Mr. Luck asked Mr. Deputy Pannell, the Chairman of the Epping Forest Committee, a question as to a proposal by the Local Authority of Leyton to erect a hospital for diphtheria and other diseases in the near vicinity of Epping Forest. Mr. Deputy Pannell said the Local Authority at Leyton had discussed a proposal for the erection of such a hospital. They had expressed a wish to interview the members of the Committee on the subject, and a deputation would attend accordingly.

THE METROPOLITAN WATER BOARD.—At a meeting of the Metropolitan Water Board, held on the 12th inst., under the chairmanship of Mr. R. M. Beachcroft, it was decided to appoint Mr. Albert B. Pilling, at present Town Clerk of Devonport, to be Clerk of the Board, at a salary of 1,500*l.* a year. The estimated expenditure of 30,000*l.* in connexion with the arbitration proceedings was passed, and it was decided to retain Mr. Fletcher Moulton, K.C., Mr. J. D. Fitzgerald, K.C., Mr. Freeman, K.C., Mr. Honoratus Lloyd, and Mr. A. B. Shaw as counsel, and Sir Alexander Binnie, Mr. G. F. Deacon, and Mr. E. Brough Taylor as advising engineers in relation to the same proceedings.

MARBLE HILL, TWICKENHAM.—At their meeting on June 9, the Richmond Town Council approved an agreement which has been provisionally arrived at on the part of their General Purposes Committee, Sir John Whittaker Ellis, and representatives of the London County Council, whereby a controversy that threatened to result in an untoward dispute is happily determined. Certain covenants have been drafted whereunder only one dwelling-house may be erected within a defined line at the back of Cambridge Park-gardens, whilst the remainder and portion of the Haversham Grange Estate are to be protected from any further buildings other than conservatories and similar garden structures. That arrangement will, in the opinion of the two Councils, fully secure the view from Richmond Hill and the amenities of the immediate neighbourhood. The house and grounds of Marble Hill were opened to the public on May 30 last. The house was built, at the charges of Frederick, Prince of Wales, for the Countess of Suffolk, Mistress of the Robes to Queen Caroline of Anspach, and afterwards became the residence of Mrs. Fitzherbert, Richard first Marquis of Wellesley, and General Peel, son of the distinguished statesman. It was erected from designs by Henry, Earl of Pembroke and Montgomery, the floors and great staircase being constructed of Honduras mahogany. Pope, it is said, laid out the gardens. The adjacent cottage, standing within the grounds, and formerly known as Spencer-grove, the

home of Kitty Clive and of Lady Diana Beauclerk, has been pulled down. The new riverside park extends over an area of 66 acres, with a frontage of 670 yards to the Thames. Building operations on part of the land were begun in July, 1901, but, at the instance of the Commons Preservation Society, the London County Council took action in the matter, under their General Powers Act of 1892, in order to prevent or regulate the erection of buildings which might be detrimental to the view from Richmond Hill, and to preserve and improve the estate.

PROSPECTIVE MANUFACTURE OF CEMENT IN RHODESIA.—Information has been received at the office of the Board of Trade from the British South Africa Co., to the effect that specimens of different calcareous rocks in the Bubi district of Southern Rhodesia have been forwarded to Buluwayo, for experimental purposes, with a view to producing cement. One specimen was experimented upon in 1895 and the result was declared equal to Portland cement. As, however, the rebellion broke out shortly after, no further steps were taken in the matter. If the opinion arrived at in 1895 should be confirmed, a profitable industry, it is thought, will result in the near future.

KING'S WEIGH HOUSE CHURCH, MAYFAIR.—Designs have been made by Mr. J. Anning Bell for three stained-glass windows to be set up in the chancel, above the communion-table, with a brass tablet beneath them. The windows will commemorate several deceased ministers of the church, which was originally established at East Cheap. Amongst them are Dr. Binney, the Rev. John Knowles, Fellow of St. Catherine's College, Cambridge, the Rev. Thomas Kentish, who was pastor during twenty years after ejectment from his rectory at Overton in Hampshire, and the Rev. Samuel Slater, who before the passing of the Act of Uniformity, 1662, had been for forty years chaplain of the Collegiate Chapel of St. Katharine-by-the Tower.

GRECIAN MARBLE.—The output of the marble quarries belonging to Marmor, Ltd. (a British company), in the Piræus and other parts of Greece, in the year 1902 amounted to 5,261,427 cubic mètres, as compared with 4,386,843 in the year 1901. There is a very considerable demand for the marble in the Greek market, and a great deal of it is now also sent abroad. For example, during the year 1902 the shipments to Hamburg comprised 310,882 cubic mètres of Pentelicus marble, 72,323 of Styra marble, 16,272 of Tinos marble, and 32,411 of Skyros marble. To New York the shipments were 40,415 cubic mètres of Pentalicus, 57,636 of Styra, 17,639 of Tinos, and 126,388 of Skyros; whilst to London were sent 54,822 cubic mètres of Styra, 41,428 of Tinos, and 83,683 of Skyros. There were also considerable exports of marble to Trieste, Leghorn, and Antwerp. Although Germany appears in the return as taking by far the larger quantity, it is probable that some of the marble sent to that country finds its way to the United Kingdom in a more finished state.

CIVIL ENGINEER APPOINTMENTS IN THE ADMIRALTY.—The Civil Service Commissioners have announced that an open competitive examination for four appointments as Assistant Civil Engineer in the Department of the Director of Works of the Admiralty will be held in July next. Forms of application for admission to the examination, together with a copy of the regulations, may be obtained forthwith on request, addressed, by letter, to the Secretary, Civil Service Commission, Burlington-gardens, London, W. The forms of application must be returned so as to reach the Civil Service Commission not later than July 2. It is understood that the salary commences at 200*l.* a year, and that Assistant Civil Engineers are eligible for promotion to higher grades.

ROYAL COMMISSION ON LONDON TRAFFIC.—On Friday, last week, evidence was given by Mr. G. L. Gomme, the Clerk to the London County Council, before this Commission. Witness gave a history of all the railway undertakings affecting London, and pointed out the great defects resulting from the want of some central authority to carry out an arranged policy. He complained that extensive interference had been permitted with streets by railway bridges, level crossings, open cuttings, embankments, &c. Passing on to the question of the obstacles to street locomotion, he expressed the opinion that the present evils, arising from the continual breaking-up of streets, were due in a large measure to the practice which had been adopted by Parliament in giving to private companies powers with regard to the breaking-up of streets which in effect over-ride the early legislation on the subject. To illustrate the extent of the evil, he quoted figures from six Borough Councils. Thus, in Kensington there were 2188 openings in the streets in 1900-1 (twelve months), and 12,843 square yards were disturbed; in Hammersmith, in twelve months there were 1,538 openings and 8,716 superficial yards disturbed; in 1901-2 there were 2,256 street openings in Fulham; in sixteen months in Southwark, from November, 1900, to March, 1902, there were 8,491 street openings, but during this period the gas company relaid their mains in certain streets, which accounted for a great many of the openings; in Paddington, in 1900-1, there were 3,303 street openings, and in Woolwich during the same period 3,088. He advocated that there should be some general control over the breaking-up of streets in London by a central authority, but thought the present evils might be minimised to some extent by giving the Council further powers with regard to subways.

THE INTERNATIONAL FIRE PREVENTION CONGRESS.—The opening of the congress has been fixed to take place at 11.45 a.m. on Monday, July 6, by the Lord Mayor of London, who will open the congress in State and will be accompanied by the Burgomaster of Brussels. The first congress conversazione will take place on the Monday evening, July 6. The general and sectional discussions will take place on the Tuesday, Wednesday, and Thursday forenoons, July 7, 8, and 9. The testing operations and inspections are fixed for the afternoons of these days, and there will be entertainments for the visitors of an evening. The congress banquet has been fixed for Wednesday, July 8.

SEPTIC TANKS.—On Tuesday, in the House of Commons, Sir John Rolleston asked the Secretary of State for the Home Department whether his attention had been called to explosions of septic tanks at Exeter during the experimental stages, at Walton-on-Naze in December last, and at Sheringham in Norfolk on May 1 last, the last of which caused the death of three people and injuries to several others; and, if so, whether in view of the number of septic tanks which have lately been erected throughout the country, he would consider the advisability of making these tanks subject to a special licence. Mr. Long, in reply, said that he was aware of the unfortunate explosion at Sheringham, and had received some information as to the other two cases referred to. The Royal Commission on Sewage Disposal were at present investigating the various methods and appliances for the disposal of sewage, including septic tanks, and he understood they had caused special inquiry to be made into the circumstances of the accident at Sheringham. Legislation would be necessary to give effect to the suggestion contained in the question, but it would seem to be desirable to await the Report of the Commission before determining whether any legislation should be undertaken on the subject.

THE SANITARY INSTITUTE.—At an examination in practical sanitary science, held in York on June 12 and 13, 1903, four candidates presented themselves. Only one of them, Mr. H. H. Oakes, was awarded a certificate.

THE CEMENT TRADE IN CALIFORNIA.—The quantity of cement imported at San Francisco in the year 1902, according to official statistics, was 162,122,186 lbs., as compared with 105,416,359 lbs. in the previous year. The details for the two years were as follows:—

From	1902. lbs.		1901. lbs.
Belgium	81,651,782	....	63,195,082
Germany	75,073,005	....	42,198,477
United Kingdom	4,395,999	....	22,800
Ecuador	1,000,000	....	—
Japan	1,400	....	—

The stocks of cement in warehouse on January 1, 1902, amounted to 230,000 barrels; the importations in 1902 were equivalent to 426,637 barrels, and 63,000 barrels were produced locally, making a total of 719,637 barrels; the estimated stocks in warehouse and on board ships in port on January 1, 1903, amounted to 110,000 barrels. The consumption of cement in northern and Central California in 1902 was 609,637 barrels. These figures show that, roughly speaking, the consumption was about 100 per cent. greater in 1902 than the average consumption of the previous five years. British cement made a better show than in 1901, but no longer enjoys the ready sale it did. Prices ruled at about 8s. 10d. per barrel in February, advancing as the stock decreased to from 11s. to 11s. 5d. in autumn, when the market weakened under an increased supply, closing about 8s. 10d. to 10s. according to quality. The new cement plant at Suisin commenced operations towards the end of August, and has since been producing about 600 barrels per day of excellent quality. This concern has secured a contract to supply 80,000 barrels for the construction of the new dry dock at Mare Island Navy Yard, and the proprietors are so well satisfied with the undertaking that they are arranging to increase the output to 1,600 or 1,700 barrels daily. A new factory is also being erected at Napa Junction, California, and will almost immediately begin operations; its capacity will be from 1,400 to 1,500 barrels daily. It is asserted that when both these plants—Suisin and Napa—are running to their full capacity they will be able to supply all the requirements of Northern and Central California, and Mr. Bennett, the British Consul-General, observes that "the opinion so frequently expressed that foreign cement would be entirely excluded from this market seems to be approaching realisation." This view is confirmed by Mr. Vice-Consul Mortimer, who writes from Los Angeles: "American and foreign cement has almost driven the British cement out of the market in this district. I have two estimates of the amount of cement likely to be used in this district in 1903. These estimates range from 200,000 to 350,000 barrels, and the latter is, I think, nearer the mark. About half will be domestic, and the remainder from Germany, Belgium, and the United Kingdom." The Vice-Consul at San Diego reports that the imports of cement in 1902 amounted to 17,428*l.* 4s., about the same as the previous year; of this the United Kingdom supplied to the value of 9,082*l.* 16s., the remainder coming from Belgium and Germany.

GRAMMAR SCHOOL, NEWARK-ON-TRENT.—It is proposed, subject to the necessary funds being forthcoming, to add to this school new buildings, which will embrace a laboratory, art-room, workshop, swimming-bath, headmaster's house, and accommodation for at least 150 boys, including 30 boarders. The present school, in the Appleton-gate, was founded in 1529 by Dr. Thomas Magnus, archdeacon of the East Riding, Yorkshire, who bequeathed to his native town an estate yielding about 2,700*l.* per annum for the maintenance of "a school of grammar and a school of song" and for other purposes on behalf of local charities and benefits. The governors of the school invite competitive designs for the new buildings.

CAPITAL AND LABOUR.

THREATENED STRIKE AT SUNDERLAND.—On Saturday last a meeting of Sunderland ship and house-joiners was held in the Central Coffee Tavern Hall to consider the wages question. The ship joiners are asking for an advance of 2s. per week, and the men in the building trade have put in a request for an increase of ½d. per hour, bringing the rate up to 10d. In connexion with the house joiners it appears that four years ago, when the men asked for an increase to 10d. per hour, the masters succeeded in bringing about an agreement for three years at 9½d. per hour, but last year, when the men sought to have the agreement renewed, the masters refused. The meeting on Saturday was in favour of a strike.

LEGAL.

BERMONDSEY BOROUGH COUNCIL AND SURREY COMMERCIAL DOCKS CO.

AT Southwark Police-court on Friday last week, Mr. Paul Taylor resumed the hearing of the summons taken out by the Bermondsey Borough Council against the Secretary of the Surrey Commercial Docks Co. for failing to give a building notice in accordance with Section 74 of the Metropolis Management Act, in respect to a new structure within the gates of the docks. The defence was that the Company was, by reason of their last Special Act which gave them power to enlarge the docks and erect new buildings, &c., exempt from this section, the two being inconsistent. Mr. Ryall, town clerk, appeared for the Borough Council and Mr. Glen, barrister, defended. Mr. Paul Taylor said that his view was that the cases quoted by Mr. Glen—The City and South London Railway *v.* London County Council, and The London County Council *v.* The London School Board—were ample authority for saying that a specific Act repealed a general Act, except upon a question of drainage. In regard to this new building there was no drainage except the carrying off of roof water into the docks, and, therefore, he thought the Dock Co.'s Special Act overruled Section 74 of the Metropolis Management Act in this case. Mr. Ryall contended that there was nothing inconsistent in the Dock Co.'s Special Act with the proviso for giving the Local Authority a building notice. He quoted several cases in support of this point. Mr. Paul Taylor reserved his judgement.

POINT UNDER SECTION 150 OF THE PUBLIC HEALTH ACT, 1875.

THE case of The Urban District Council of Stretford *v.* The Manchester South Junction and Altrincham Railway Co. came before the Court of Appeal, composed of Lords Justices Vaughan Williams, Romer, and Stirling, last week on the appeal of the defendants from a judgment of the Vice-Chancellor of the County Palatine of Lancaster.

It appeared that the railway company had purchased under their compulsory powers, on which in the year 1894 they constructed, a road called Elsinore-road, Old Trafford, leading from Seymour-grove, as an approach to the defendants' Old Trafford station, the approach being a slope parallel to and adjoining the station. The plaintiffs, the Urban District Council, in March, 1900, under Section 150 of the Public Health Act, 1875, served the defendants with the usual notices to "frontagers" to make up the road as being a "street" within the meaning of the Act. As defendants did not comply with the notice, plaintiffs made up the road and served defendants with notice, under Section 257, that 354*l.* 1s. 9d. was due from defendants for the expenses incurred, and plaintiffs in the following June served the defendants with a demand for immediate payment. The defendants denied liability, alleging that the road never was, prior to March, 1900, laid out as a street, nor had even been dedicated to the public, it being only used by the public by leave of the defendants. Defendants also said that before the works were commenced they gave the plaintiffs notice that the road was not a "street," and that plaintiffs were not entitled to give the notice of March, 1900, or to execute the works in

question. Defendants also said that the plaintiffs, in executing the works, had wrongly altered the width of the road. The plaintiffs then commenced the present action, claiming a declaration that the expenses incurred in making up the road, together with interest thereon and the costs of the action, were a charge on the defendants' premises in Elsinore-road, and to have such charge enforced by the appointment of a receiver. The Vice-Chancellor at the trial gave judgment in favour of the plaintiffs, declaring that the amount claimed was a charge upon the defendants' premises. Hence the present appeal of the defendants.

In the result their Lordships upheld the decision of the Vice-Chancellor, and dismissed the appeal with costs.

Mr. Haldane, K.C., Mr. Clarkson, and Mr. Mark Romer were counsel for the appellants; and Mr. Astbury, K.C., and Mr. A. Grant for the respondents.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

6,400 of 1902.—G. F. THOMSON: *Manufacture of Artificial Stone and Apparatus therefor.*

The process of manufacturing artificial stone, consisting in running an artificial stone mixture in a liquid condition into moulds arranged in such a manner that the flagstones or other articles to be cast are on edge, applying pressure to the upper edges of the said flagstones or other articles, and allowing the artificial stone mixture to set.

11,372 of 1902.—R. STANLEY: *Manufacture of Earthenware Sanitary Pipes, Cable Conduits, Ridge Tiles, Roofing Tiles, and Other like Objects.*

The mould employed consists of a fixed cylindrical core of somewhat greater length than the pipe to be moulded, and equal to its interior diameter. Surrounding this, leaving a space sufficient for the thickness of the intended pipe, is a cylindrical mould, equal in length to the core. A cylindrical plunger works up from below and another down from above within the said space, so that the material, after being introduced therein, is compressed between the two plungers by the descent of the upper one, and is raised for delivery in a moulded state by the ascent of the lower one in conjunction with the outer mould to slightly above the core of the mould. The inner wall of the mould and the outer surface of the core are preferably kept lubricated, resulting in a smooth polish upon the outer and inner surfaces of the pipe. The latter being moulded to the exact length required, no cutting devices for such purpose are needed, but grooving devices are provided for socketed pipes or conduits. The requisite pressure for working the plungers is obtained by two hydraulic rams, which, for the sake of convenience and safety, it is preferable to employ.

11,890 of 1902.—C. TÖNGES: *Means for Controlling the Flow of Liquids from or to Chambers, Pipes, and other Receptacles.*

Means for preventing the escape of liquids from chambers, pipes, or the like, consisting in the outlet aperture of the said chambers, pipes, or the like being covered with a permeable substance such as fine wire-netting, silk gauze, or the like, which material allows the liquid to pass when pressure is exerted thereon, but on the pressure or suction action being removed does not allow any air to pass through it, thereby preventing the liquid contained in the vessels from moving either forwards or backwards.

2,544 of 1903.—J. A. WILKIE: *A Combination Fireproof Draw-in System of Electric-light Wiring and Tubing.*

A combination fireproof "draw-in" system of electric-light wiring and tubing, whereby the tubes or other mechanical protection of the conductors are so arranged and twined with cord or wire that the conductors may be drawn into or withdrawn from the tubes at any time from either end of the tube.

2,577 of 1903.—C. E. JEFFCOCK and W. H. YARDLEY: *Apparatus for Breaking or Crushing Pulverulent Substances.*

In toggle plates used in apparatus for breaking or crushing pulverulent substances, in combination, a nose part, a sleeve part, and shearable pins, the nose part being located and adapted to slide within the sleeve part, the nose and sleeve parts being formed with holes adapted to register, and the pins of a definite shearing resistance being adapted to engage with such holes when in register and to locate the nose and sleeve parts in operative condition, so that upon such resistance being exceeded the nose part will recede within the sleeve part.

2,587 of 1903.—W. F. WILMOT, E. I. SMITH, and S. GOLLIEK: *Fireproof Floors, Ceilings, and the Like.*

In the construction of floors and ceilings of buildings, vault covers, and the like, the provision of suspender rods and centre-piece supporting beams hung thereon.

5,978 of 1903.—F. HENNEBIQUE: *Process or Method of Making Pipes, Conduits, Columns, Casings, or the Like of Cement Beton or other Agglomerate Material.*

A process or method of making pipes, conduits, columns, casings, or sheaths of cement beton or other like agglomerate material, strengthened or not with metal rods and the like, said process consisting in charging the said beton or agglomerate into a tubular metallic or other receptacle, the internal surface of which has the form of the external surface of the pipe or sleeve to be obtained, in closing the ends of the receptacle (after the foundation or lining of metal rods has been previously embedded in case the pipes to be made are formed of strengthened beton), and in then subjecting this receptacle to a rotary movement, which under the action of centrifugal force uniformly moulds and compresses the material placed in the interior against the surface of the mould and expels water and air.

1,461 of 1902.—A. ASHWORTH: *Cowls for Ventilating Shafts and Chimney Tops.*

In a ventilating cowl or hood, a funnel-shaped adjunct having its produced axis below the centre of the exit, and provided with internal helical blades and means for directing wind into the channels between the blades.

18,031 of 1902.—D. G. EDNIE: *Windows.*

A window having one or both sashes hung by weight-cords or chains whose ends are pivotally secured in keyhole slotted plates fitted in the sashes.

4,951 of 1903.—O. WALL and R. G. HUGHES: *Locks for Sashes and the Like.*

This consists in the combination with a sheet-metal casing, and a depending plate, of a staple secured in said plate, a spring-urged bolt in said casing, a depending hasp on one end of the bolt to take over said staple, a loose collar on and a roller in the opposite end of the said bolt, a supplementary bolt parallel to the main bolt and held in straps forming one piece with the base plate of the casing.

6,907 of 1903.—A. JANKIEWICZ: *Door-closing Apparatus.*

A door-closing apparatus comprising a bracket fixed to the door and carrying a drum formed with a portion of a high-pitch screw-thread, which latter effects the closing of the door by acting upon the friction-roller of a weighted lever also fixed to the door, and controlled by adjustable means secured to the door-post, or case, and whereby the said screw-drum is held stationary (or practically so) in its bracket.

6,989 of 1903.—A. W. ZETTERBERG: *Sign Boards, Glass Ceilings, or the Like.*

This relates to sign boards, glass ceilings, and the like of glass, which consists of one or more glass plates and one or more non-transparent plates arranged behind the said glass plates and having letters, ornaments, or the like cut in them, the arrangement that the letters, ornaments, and the like are formed by holes or openings in the said non-transparent plates, and that the bottoms of the said holes or openings consist of reflecting-plates coloured in the same manner as the edges of the said holes or openings.

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

MEETINGS.

FRIDAY, JUNE 19.

Institution of Civil Engineers.—Engineering Conference, concluded.

SATURDAY, JUNE 20.

Architectural Association.—Visit to the Building Trades Exhibition, 3 p.m.

Incorporated British Institute of Certified Carpenters.—Visit to the Building Trades Exhibition, Royal Agricultural Hall, 3 p.m.

MONDAY, JUNE 22.

Royal Institute of British Architects.—(1) Special general meeting to confirm, in accordance with Clause 33 of the Charter, the resolution passed at the special general meeting of June 8, viz.:—"That, subject to the sanction of the Lords of the Privy Council, the words 'during the five years from the date of approval of this provision by the Privy Council' be omitted from the proviso of By-law 9." (2) Sixteenth general meeting (ordinary) to present the Royal Gold Medal for the Promotion of Architecture, conferred by his Majesty the King, to Mr. Charles Follen McKim, of New York, for his executed works as an architect. 8 p.m.

TUESDAY, JUNE 23.

Royal Institute of British Architects.—Annual dinner, Whitehall Rooms, Hôtel Métropole. 7, for 7.30 p.m.

WEDNESDAY, JUNE 24.

Royal Institute of British Architects.—Meeting of the Presidents of the Allied Societies.

Junior Institution of Engineers.—Visit to Messrs. Spiers & Pond's model laundries, art dyeing and chemical cleaning, and steam carpet-beating department, 140, Battersea Park-road, S.W. 6.30 p.m.

Builders' Foremen and Clerks of Works' Institution.—Half-yearly meeting of the Directors. 8 p.m.

THURSDAY, JUNE 25.

London Master Builders' Association.—General Purpose Committee. 3 p.m.

Incorporated Association of Municipal and County Engineers.—Thirtieth Annual General Meeting, Kensington.

FRIDAY, JUNE 26.

Junior Institution of Engineers.—At the Finsbury Technical College (by permission of the authorities, and on the invitation of Mr. R. P. Howgrave Graham) Mr. Graham will deliver a lecture, illustrated by experiments, on "High-Frequency Electric Discharges." 7.30 p.m.

Incorporated Association of Municipal and County Engineers.—Annual General Meeting, continued.

SATURDAY, JUNE 27.

Incorporated British Institute of Certified Carpenters.—Visit to the new Marlborough Theatre, Holloway-road, 3 p.m.

Incorporated Association of Municipal and County Engineers.—Annual General Meeting, concluded.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

June 3.—By G. TROLLOPE & SONS (at Frome).

Great Elm, Somerset.—Elmhurst and 9 a. 1 r. 9 p., f., p.	£900
Newland's Farm, 9 a. 0 r. 8 p., f., y.r. 45l.	763

June 4.—By MADDISON, MILES, & MADDISON (at Bungay).

Earsham, Norfolk.—The Duke's Head, p.-h., f., p.	750
Wortwell, Norfolk.—Four freehold cottages and 0 a. 0 r. 38 p.	160

By W. H SHIMER & WINTER (at Bristol).

Wrington, Somerset.—Leigh Hole Farm, 184 a. 2 r. 28 p., f.	5,300
Four freehold cottages and 0 a. 2 r. 14 p.	130
Various enclosures, 16 a. 2 r. 38 p., f.	1,440

June 5.—By SPELMANS' (at East Dereham).

Gressenhall, Norfolk.—The Barn Lands, 21 a. 2 r. 9 p., f. and c.	400
Farmhouse and 121 a. 1 r. 24 p., f. and c.	1,425
An occupation farm, 73 a. 1 r. 29 p., f. and c.	1,175

June 6.—By SPELMANS' (at Norwich).

Tivetshall, Norfolk.—The Railway Farm, 90 a. 0 r. 23 p., f.	1,100
East Carlton, Norfolk.—Freehold double cottage, w.r. 20l. 10s.	192

By ELWORTHY & SON (at Wisbech).

Christchurch, Cambs.—Freehold farm, 152 a. 0 r. 14 p.	6,000

By BRUTON, KNOWLES, & CO. (at Gloucester).

Sandhurst, Gloucester.—Wallington Court and Brown Pavns, 375 a. 1 r. 31 p., f., y.r. 655l.	11,000

June 8.—By ALFRED C. FROST.

Barnes.—106, Castlenau, u.t. 36¾ yrs., g.r. 10l. 5s., e.r. 70l.	550
Streatham.—Equity of redemption of 61, 63, and 65, Eastwood-st., u.t. 98 yrs., g.r. 18l., y.r. 102l.	150

By KEMBLEYS'.

Chigwell Row.—Great House and 33 a. 0 r. 10 p., c., p.	5,100
The Uplands and 14 a. 3 r. 30 p.; also Chapel cottages, f., y.r. 77l. 17s.	
Main rd., freehold cottage and ¼ acre	300

By THOMAS, PEYER, & MILES.

Eaton Socon, Beds.—The Eaton Socon Brewery and six licensed houses, f.	2,825

By ALFRED RICHARDS.

Tottenham.—10, Stamford-rd., u.t. 51 yrs., g.r. 2l., y.r. 21l.	210

By ROBINS & HINE.

Piccadilly.—5, Air-st., u.t. 15 yrs., g.r. 10l., y.r. 150l.	2,900
Belgravia.—100, Ebury-st., u.t. 19¾ yrs., g.r. 6l., y.r. 90l.	800
33, Chesham-st., u.t. 16¾ yrs., g.r. 21l., y.r. 175l.	1,510

By ROGERS, CHAPMAN, & THOMAS.

Mill Hill.—Hale-la., freehold building land, 5 a. 2 r. 27 p.	2,190
Islington.—Caledonian-rd., &c., l.g.r. 2 140l., u.t. 44 yrs., g.r. 15l.	2,000
Sutterton-st., l.g.r. 50l., u.t. 42 yrs., g.r. 2l.	720

By WIGLEY & TEDDER.

Dulwich.—26, Carson-rd., u.t. 87 yrs., g.r. 8l. 10s., e.r. 60l.	560

By PROTHEROE & MORRIS (on the estate).

Clacton-on-Sea, Essex.—King's Parade, &c., 77 plots of freehold building land (in lots)	1,360

June 9.—By DAVID BURNETT & CO.

Spitalfields.—372, Gun-st. (warehouse), area 8,200 ft., f., y.r. 100l.	2,000

By DIXON & CO.

Balham.—Bedford Hill-rd., Ashmere, u.t. 73 yrs., g.r. 12s. y.r. 60l.	450

By FAREBROTHER, ELLIS, & CO.

Hanover-st.—No. 9 (S), f., y.r. 375l.	12,750

By J. GRIFFIN & SON.

Ealing.—12, 13, 14, 15, 19, and 25, Kirchen-rd., u.t. 55 yrs., g.r. 31l., y.r. 174l.	1,510

By JAMES WILSON.

Catford.—75 and 77, Catford-hill, u.t. 60 yrs., g.r. 8l., e.r. 68l.	635

By GEO. YEATES & SONS (at Worcester).

Elmley Lovett, Worcester.—The Moat Farm, 134 a. 1 r. 12 p., f. (in lots)	2,665

June 10.—By BAXTER, PAYNE, & LEPPER.

Westerham Hill, Kent.—Main road, two enclosures of land with farm buildings, 5 a. 3 r. 31 p., f.	450

By DRYSDALE, NURSE, & CO.

Stamford Hill.—72 and 76, Dalerieve-rd., u.t. 33 yrs., g.r. 12l. 6s., y.r. 64l.	560

By WM. HOLLIS.

Finchley.—Cavendish-av., Lamorran, Westholme, and Parkdene, f., y.r. 135l.	1,790
Hendon-la., Hirstleigh, f., y.r. 94l.	1,050

By HORNE & CO.

Dulwich.—43 and 49, Oakhurst-gr., u.t. 75 yrs., g.r. 20l., y.r. 70l.	680

By F. JOLLY & CO.

Leyton.—Lea Bridge-rd., two plots of building land, f.	250

By MATTHEWS, MATTHEWS, & GOODMAN.

Hampstead.—42, Agincourt-rd., u.t. 80¾ yrs., g.r. 7l., y.r. 52l. (including mortgage)	550

By MIDDLETON & CRACKNELL.

Hampstead.—14, Gayton-cres. and plot of land in rear, part f. and part u.t. 65¾ yrs., g.r. 6l., e.r. 85l.	1,700

By RUMSEY & STEVENS.

Notting Hill.—Norland-sq., l.g.r. 30l., reversion in 30 yrs.	890
Anerley.—Beverley-rd., &c., l.g.r. 2 275l., reversion in 61 yrs.	8,620

By C. P. WHITELEY.

Scotch Means, Mides.—New-rd., the Wash Farm, 70 a. 3 r. 32 p., f., y.r. 112l.	3,250

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* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

By DOUGLAS YOUNG & Co.

Tooting.—Mitcham-rd., a freehold building estate with three residences thereon (Woodside, Lindenwood, and Hope Cottage), area 3 a. £4,600
Croydon.—The Parade, &c., f.g.r.'s 265*l.* 4s., reversion in 96 yrs. 6,150
Battersea.—2, Battersea-rise (S), u.t. 77 yrs., g.r. 16*l.* 13s. 4d., y.r. 60*l.* 600
1 to 4, Harley-st., u.t. 33 yrs., g.r. 16*l.*, w.r. 145*l.* 12s. 880

By J. R. THORNTON (at Brighton).

Hurstpierpoint, Sussex.—Wickham Farm, 34 a. 0 r. 21 p., f., p. 5,500
Wickham-la., plot of building land, 1 a. 2 r. 32 p., f. 300
Rockford Farm, 13 a. 3 r. 11 p., f., p. 1,000

June 11.—By H. J. BLISS & SONS.

Bethnal Green.—24, 26, 28, and 30, Cranbrook-st., u.t. 50 yrs., g.r. 9*l.*, w.r. 120*l.* 18s. 760
Leytonstone.—13 to 21 (odd), Beulah-rd., f., w.r. 97*l.* 10s. 960
Stratford.—88 to 94 (even), Farringford-rd., u.t. 78 yrs., g.r. 10*l.*, w.r. 83*l.* 16s. 630
30 and 32, Vernon-rd., u.t. 88 yrs., g.r. 5*l.*, w.r. 42*l.* 18s. 365
Forest Gate.—32 and 34, Knighton-rd., u.t. 95 yrs., g.r. 8*l.*, w.r. 78*l.* 570

By DEBENHAM, TEWSON, & Co.

Notting Hill.—68, High-st. (S), u.t. 48 yrs., g.r. 8*l.*, y.r. 225*l.* 1,930
Kingsland.—89, High-st. (S), u.t. 60 yrs., g.r. 15*l.*, p. 1,200
Hyde Park.—Westbourne-ter. North, f.g.r. 18*l.*, reversion in 47 yrs. 540
Hammersmith.—Southerton-rd., f.g.r.'s 30*l.*, reversion in 62 yrs. 770

By R. A. ENRIGHT.

Limehouse.—43, 47, and 49, Rhodeswell-rd. (S), u.t. 73 yrs., g.r. 22*l.* 12s., e.r. 120*l.* 340

By HAMNETT & Co.

Kensington.—38, Holland Villas-rd., with stabling, area 12,150 ft., f., y.r. 260*l.* 4,930

By K. H. HENRY.

Battersea.—174, Lavender Hill, area 73,000 ft., f., p. 10,000

By SALTER, REX, & Co.

Holloway.—174, Junction-rd., u.t. 48 yrs., g.r. 5*l.*, e.r. 52*l.* 10s. 550
Kentish Town.—53, Dartmouth Park Hill, u.t. 49 yrs., g.r. 10*l.*, e.r. 52*l.* 10s. 400

By STIMSON & SONS.

Fulham.—25, 25a, to 33, 33a (odd), Wardo-av., u.t. 91¼ yrs., gr. 32*l.* 10s., w.r. 325*l.* 2,450
63 and 65, Wardo-av. (S), u.t. 91¼ yrs., g.r. 16*l.*, y.r. 130*l.* 1,140
Croydon.—23 to 33 (odd), Longfellow-rd., u.t. 99 yrs., g.r. 27*l.*, w.r. 156*l.* 740

By WM. WESTON.

Regent's Park.—11, Chester-pl., u.t. 22 yrs., g.r. 16*l.*, y.r. 80*l.* 530

By NEWBON, EDWARDS, & SHEPHARD.

Barnsbury.—14, 15, 17, 18, 20, 21, 22, 23, 25, 26, 53, and 55, Thornhill-sq., u.t. 42 yrs., g.r. 84*l.*, y.r. 377*l.* 4s. (in lots) 5,960
Holloway.—Andover-rd., f.g.r. 22*l.* 10s., reversion in 49 yrs 560
17 to 23, 33, 35, 39 to 57 (odd), Andover-rd., u.t. 49 yrs., g.r. 76*l.* 10s., w.r. 565*l.* 10s. 3,020
1, 2, 3, 4, 9, and 10, Andover-gr., u.t. 49 yrs., g.r. 24*l.*, w.r. 157*l.* 6s. 765
210, St. James-rd. (S), u.t. 40½ yrs., g.r. 8*l.*, w.r. 35*l.* 2s. 205
88 and 90, Tollington Pk., f., y.r. 90*l.* 1,420
Old Ford.—138 and 140, Usher-rd., f., w.r. 72*l.* 16s. 705
Upton Park.—29, Bristol-rd., u.t. 85 yrs., g.r. 3*l.* 10s., w.r. 22*l.* 2s. 130
Bromley-by-Bow.—12, Box-st., u.t. 96½ yrs., g.r. 2*l.* 10s., w.r. 20*l.* 16s. 105
Shepherd's Bush.—90, 92, 96, and 98, Percy-rd., u.t. 73 yrs., g.r. 24*l.*, y.r. 243*l.* 1,425

June 12.—By ARTHUR ALDRIDGE & Co.

Beckenham, Kent.—103 and 105, High-st., u.t. 75 yrs., g.r. 20*l.*, y.r. 135*l.* 1,380
Bayswater.—59, Hereford-rd., u.t. 47½ yrs., g.r. 8*l.*, y.r. 55*l.* 420
Hampstead-rd.—16 and 17, Oakley-sq., u.t. 47½ yrs., g.r. 24*l.*, y.r. 145*l.* 1,280
6, Harrington-sq., u.t. 38 yrs., g.r. 11*l.*, y.r. 75*l.* 630

By F. HILL CLARKE.

Whitechapel.—113, Mile End-rd., f., y.r. 47*l.* 5s. 1,040
50 and 52, Great Prescott-st., f., y.r. 87*l.* 2,075
Tenter-st. South, a plot of building land, area 560 ft., f., p. 230

By HOLLINGSWORTH & COLLYER.

King's Cross.—34, North-st. (S), u.t. 31 yrs., g.r. 8*l.*, w.r. 61*l.* 2s. 350
Stepney.—Eastfield-st., f.g.r. 10*l.*, reversion in 20 yrs. 221
98, 100, and 102, Exmouth-st., u.t. 10 yrs., g.r. 12*l.*, w.r. 130*l.* 420
Mile End.—498, Mile End-rd. (S), u.t. 14 yrs., g.r. 10*l.*, q.r. 48*l.* 210
Dalston.—105, Graham-rd., u.t. 58½ yrs., g.r. 7*l.*, e.r. 44*l.* 470

By MORGAN, BAINES, & CLARK.

Sutton, Surrey.—Albion-rd., Merlewood, Wavretree, Fayremead, Ettrick Lodge, The Rowans, and Redlands, f., y.r. 490*l.* 8,340
Albion-rd., nine plots of building land, f. 1,660
Langley Park-rd., five plots of building land, f. 650

By C. & F. RUTLEY.

Caterham, Surrey.—Ninhams-rd., two plots of building land, f. 575

By J. D. WOOD & Co.

Stoke, Warwick.—Copsewood Grange Estate, 146 a. 2 r. 8 p., f. 17,000

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.			
Hard Stocks	1 15 0	per 1,000 alongside, in river.		
Rough Stocks and Grizzles.....	1 12 0	,,	,,	,,
Facing Stocks....	2 12 0	,,	,,	,,
Shippers	2 5 0	,,	,,	,,
Flettons	1 7 6	,,	at railway	depôt
Red Wire Cuts ..	1 12 0	,,	,,	,,
Best Fareham Red	3 12 0	,,	,,	,,
Best Red Pressed Ruabon Facing	5 0 0	,,	,,	,,
Best Blue Pressed Staffordshire ..	4 5 0	,,	,,	,,
Do. Bullnose	4 11 0	,,	,,	,,
Best Stourbridge Fire Bricks	4 8 0	,,	,,	,,
GLAZED BRICKS.				
Best Whites and Ivory Glazed Stretchers.....	13 0 0	,,	,,	,,
Headers	12 0 0	,,	,,	,,
Quoins, Bullnose, and Flats.....	17 0 0	,,	,,	,,
Double Stretchers	19 0 0	,,	,,	,,
Double Headers..	16 0 0	,,	,,	,,
One Side and two Ends.....	19 0 0	,,	,,	,,
Two Sides and one End	20 0 0	,,	,,	,,
Splays, Chamfered, Squints.....	20 0 0	,,	,,	,,
Best Dipped Salt Glazed Stretchers and Headers	22 0 0	,,	,,	,,
Quoins, Bullnose, and Flats.....	14 0 0	,,	,,	,,
Double Stretchers	15 0 0	,,	,,	,,
Double Headers..	14 0 0	,,	,,	,,
One Side and two Ends.....	15 0 0	,,	,,	,,
Two Sides and one End	15 0 0	,,	,,	,,
Splays Chamfered, Squints.....	14 0 0	,,	,,	,,
Second Quality White and Dipped Salt Glazed	9 0 0	,,	less than best.	
Thames and Pit Sand	6	9	per yard, delivered.	
Thames Ballast	6	0	,,	,,
Best Portland Cement	90	0	per ton, delivered.	
Best Ground Blue Lias Lime..	20	6	,,	,,

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 10s 6d. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.		
Ancaster in blocks	1 11	per ft. cube, deld	rly. depôt.
Bath ,, ...	1 7	,,	,,
Farleigh Down Bath ..	1 8	,,	,,
Beer in blocks	1 6	,,	,,
Grinshill ,, ...	1 10	,,	,,
Brown Portland in blocks	2 2	,,	,,
Darley Dale in blocks..	2 4	,,	,,
Red Corsehill ,,	2 5	,,	,,
Closeburn Red Freestone	2 0	,,	,,
Red Mansfield ,,	2 4	,,	,,

YORK STONE—*Robin Hood Quality.*

	s. d.		
Scappled random blocks	2 10	per ft. cube, deld.	rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super.	,,
6 in. Rubbed two sides Ditto, Ditto	2 6	,,	,,
3 in. Sawn two sides slabs (random sizes)..	0 11½	,,	,,
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	,,	,,
1¼ in. to 2 in. ditto, ditto	0 6	,,	,,
BEST HARD YORK—			
Scappled random blocks	3 0	per ft. cube	,,
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super.	,,
6 in. Rubbed two sides Ditto	—	,,	,,
3 in. sawn two sides slabs (random sizes)	1 2	,,	,,
2 in. self-faced random flags.....	0 5	,,	,,
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.	
,, ,, ,, 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt	
,, ,, ,, 3 in. do.	1 2½	,,	,,

SLATES.

in.	in.	£ s. d.		
20×10 best blue Bangor..		13 2 6	per 1000 or 1200 at rly. dep.	
20×12 ,, ,, ,,		13 17 6	,,	,,
20×10 best seconds ,,		12 15 0	,,	,,
20×12 ,, ,, ,,		13 10 0	,,	,,
16×8 best ,, ,,		7 0 0	,,	,,
20×10 best blue Portmadoc ..		12 5 0	,,	,,
16×8 best blue Portmadoc		6 5 0	,,	,,
20×10 best Eureka unfading green....		15 2 6	,,	,,
20×12 ,, ,,		17 8 6	,,	,,
18×10 ,, ,,		12 10 0	,,	,,
16×8 ,, ,,		10 5 0	,,	,,
20×10 permanent green		11 0 0	,,	,,
18×10 ,, ,,		9 5 0	,,	,,
16×8 ,, ,,		6 10 0	,,	

PRICES CURRENT (*Continued*).

TILES.

	s. d.			
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.		
Hip and valley tiles....	3 7	per doz.	,,	,,
Best Broseley tiles	50 0	per 1,000	,,	,,
Do. Ornamental Tiles	52 6	,,	,,	,,
Hip and valley tiles....	4 0	per doz.	,,	,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000	,,	,,
Do. ornamental Do.	60 0	,,	,,	,,
Hip tiles	4 0	per doz.	,,	,,
Valley tiles.....	3 0	,,	,,	,,
Best Red or Mottled Staffordshire Do. (Peakes)	51 0	per 1,000	,,	,,
Do. Ornamental Do.	54 0	,,	,,	,,
Hip tiles	4 1	per doz.	,,	,,
Valley tiles.....	3 8	,,	,,	,,
Best "Rosemary" broad plain tiles	48 0	per 1,000	,,	,,
Do. Ornamental Do.	50 0	,,	,,	,,
Hip tiles	4 0	per doz.	,,	,,
Valley tiles	3 8	,,	,,	,,

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	,, ,,
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	,,
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

JOINERS' WOOD.	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
,, ,, 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
,, ,, 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
,, ,, ,, 3 in. by 9 in.	12 10 0	13 10 0
,, ,, ,, battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Dansig and Stettin Oak Logs—		
Large, per ft. cube	0 2 6	0 3 6
Small ,, ,, ...	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—		
Per ft. cube	0 4 0	- - -

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 9-in.

[*See also page 643.*

COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Machinery for Lifting Boats	Austrian Government	100,000 Kronen, 75,000 Kronen, and 50,000 Kronen	Mar. 3, 1904

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
*New Laundry, &c., at Smallburgh Workhouse	Smallburgh Union	F. Davies, Solicitor, North Walsham	June 20
*Small Mission Church, New Malden	.....	V. Davison, Architect, New Malden	June 22
Additions to Workhouse	Truro Guardians	F. Truscott, Board Room, Workhouse, Truro	June 23
Shelters, &c.	Weston-super-Mare U.D.C.	H. Nettleton, Surveyor, Town Hall, Weston-super-Mare	do.
Villa, Stotfield, near Elgin	.....	C. C. Doig, Architect, Elgin	do.
Six Shops, Cudworth, near Barnsley	.....	T. Elliott, Wombwell	do.
Additions to Goods Shed, Chippenham	Great Western Railway Company	G. K. Mills, Paddington Station, London	do.
Paving Works	Tipton U.D.C.	W. H. Jukes, Surveyor, Public Offices, Tipton	do.
Road Works	Sowerby Bridge U.D.C.	Town Surveyor, Sowerby Bridge	do.
Street Works	Wednesbury Town Council	E. M. Scott, Borough Engineer, Town Hall, Wednesbury	do.
Cast-iron Pipes	Mountain Ash U.D.C.	H. P. Linton, Town Hall, Mountain Ash	do.
Sewers, &c., Villa-road	Lanchester R.D.C.	G. W. Westgarth, Surveyor, Lanchester	do.
Sewers, &c., Wharfdale-street	Wednesbury Corporation	E. M. Scott, Borough Surveyor, Town Hall, Wednesbury	do.
Sewers, &c., Alum Rock-road	Birmingham Corporation	J. Price, City Engineer, Birmingham	do.
Sewers, Edentown	Carlisle R.D.C.	F. Barker, Surveyor, 14, Bank-street, Carlisle	do.
Pier Works, Largs Pier	Glasgow & S. W. R. Company	F. H. Gillies, St. Enoch Station, Glasgow	do.
Sewers, &c., Chatterton and elsewhere	Ramsbottom (Lancs) U.D.C.	J. Diggle, Civil Engineer, Hill-street, Heywood	do.
House, Castle-street, Tredegar	The Trustees	T. Jones, 50, Commercial-road, Tredegar	do.
Road Metal, &c., Tankerton Estate, Whitstable	.....	A. A. Kemp, Surveyor, Whitstable	do.
*Erection of University College, Sheffield	The Committee	Gibbs & Flockton, Architects, 15, St. James's-row, Sheffield	do.
*New Floor Surface Drainage, &c.	City of London Union	Clerk to the Guardians, 61, Bartholomew-close, E.C.	do.
Chapel, Leeming, Bedale	.....	A. Shepherd, Leeming, Bedale	June 24
Additions to Club Premises, Ellerby-road, Leeds	.....	G. Midgley, East Ward, Liberal Club, Leeds	do.
Additions to Chapel, Nelson, Wales	.....	R. S. Griffiths, Architect, Tonypandy	do.
Pair of Villas, Skircoat, Halifax	.....	W. C. Williams, Architect, 29, Southgate, Halifax	do.
Drainage Works at Workhouse, Damer's-road	Dorchester Guardians	A. L. T. Tilley, Architect, South-street, Dorchester	do.
Asphalting Play Grounds at Schools, Fairfield	Cockermouth School Board	T. C. Burn, School Board Offices, Cockermouth	do.
Road Works, Garfield-road, and others	Enfield U.D.C.	R. Collins, Surveyor, Court House, Enfield	do.
Underground Convenience, George-street	Stroud U.D.C.	E. N. Witchell, 1, Lansdown, Stroud	do.
Water Supply Works, Blackwood	Lanark County Council	Warren & Stuart, Civil Engineers, 94, Hope-street, Glasgow	do.
Additions to Gas Works	Colwyn Bay U.D.C.	J. C. Pennington, Engineer, Colwyn Bay	do.
Paving Works at Sewage Works, Weaste	Salford Town Council	L. C. Evans, Town Hall, Salford	do.
Chimney, Low Fields	Elland, Yorks, U.D.C.	J. Clarkson, Council Offices, Elland	do.
Road Works, Holcombe-road	Tottingdon (Lancs) P. O. Tipton	L. Kenyon, Surveyor, 33, Chapel-street, Tottington	do.
Tower, St. Luke's Church, Mow Cop, Staffs	.....	C. Hodson Fowler, Architect, The College, Durham	June 25
Hospital, Purdysburn	Belfast Corporation	Young & Mackenzie, Architects, Belfast	do.
Additions to Holy Trinity Schools, Barnstaple	.....	J. C. Southcombe, Architect, Barnstaple	do.
Works at Greenhouses, &c., at St. Margaret's Cemetery	Rochester Town Council	W. T. Callund, Surveyor, 2, South-avenue, Rochester	do.
Additions to Workhouse	Lutterworth Guardians	W. M. Cowdell, Architects, 12, Greyfriars, Leicester	do.
Additions to Bethany Chapel, Maesteg	.....	W. Beddoe Rees, Architect, 37, St. Mary-street, Cardiff	do.
Walls, &c., at Retort House, Gaythorn	Manchester Corporation	J. G. Newbigging, Civil Engineer, Town Hall, Manchester	do.
Ten Houses, Upper Rushton-road, Thornbury, Yorks.	.....	Walker & Collinson, Architects, 227, Swan-arcade, Bradford	do.
Schools, Georgetown	Merthyr Tydfil School Board	J. L. Smith, Architect, 50, High-street, Merthyr Tydfil	do.
Additions to Schools, Dowlais	do.	do.	do.
Re-erection of the City Mills, Morley, Yorks.	.....	Buttery & Birds, Architects, Queen-street, Morley	do.
Bridge, Saredon	Cannock (Staffs) R.D.C.	H. M. Whitehead, Surveyor, Penbridge, near Stafford	do.
Street Works, &c., Cowper-street	Luton Town Council	G. Sell, Town Hall, Luton	do.
Broken Granite, &c. (1,200 tons)	Lewes Town Council	Borough Surveyor, Town Hall, Lewes	do.
Additions to Gas Works, Albion-street	Salford Corporation	W. W. Woodward, Engineer, Gas Offices, Salford	do.
Granite Road Metal	North Walsham (Norfolk) U.D.C.	E. J. Simpson, Surveyor, North Walsham	do.
Sewers, &c., Moat-road, Warley	Oldbury Town Council	T. H. Shipton, Surveyor, Public Buildings, Oldbury	do.
Car Shed, Bridgefold	Rochdale Corporation	S. S. Platt, Civil Engineer, Town Hall, Rochdale	do.
Street Works, Pitt-street, &c.	Stockport Corporation	J. Atkinson, Civil Engineer, St. Petersgate, Stockport	do.
*Stabling & Cart Sheds at Central Depot, Longfield-av.	Ealing Town Council	Council's Engineer, Town Hall, Ealing, W.	do.
Sewerage Works, Ferrybridge	Pontefract R.D.C.	J. Waugh, Civil Engineer, Sunbridge Chambers, Bradford	June 26
Water Supply Works	Goring-on-Thames Water Co., Ltd.	G. H. Robins, Engineer, Mansion House Chambers, London, E.C.	do.
House, Meg-lane, Cliffe End, Long Wood	.....	P. Taylor & Co., Architects, Milnsbridge	do.
Stabling, &c., Leys, Tamworth	The Committee	J. W. Godderidge, Architect, Tamworth	June 27
Chapel, Pontygwaith, Wales	The Trustees	R. S. Richards, Architect, Tony-pandy	do.
Two Cottages, Newton-le-Willows, Lancs	Newton-in-Makerfield U.D.C.	C. Cole, Town Hall, Earlestown	do.
Water Supply Works, Brigstock	Thrapston (Northants) R.D.C.	J. Chadwick, Civil Engineer, Bletchley	do.
Granite Setts, &c., near Oldham	Royton U.D.C.	T. Blessington, Surveyor, Town Hall, Royton	do.
*Tiles	Battersea Borough Council	Electricity Department, Lombard-road, Battersea, S.W.	June 29
Six Shops, English-street, Armagh	Messrs. Wormall Bros., & Co.	W. H. Stephens & Sons, Architects, 15, Donegall-square N., Belfast	do.
Underground Conveniences, High-street	Stockton-on-Tees Corporation	Borough Engineer, Borough Hall, Stockton	do.
Bridge, Bishopton-road	do.	do.	do.
Road Materials, &c. (2,650 tons)	Bedford Corporation	R. O. Seacome, Town Hall, Bedford	do.
Works at Market Hall	Trowbridge U.D.C.	H. G. Nicholson-Lalley, Surveyor, Town Hall, Trowbridge	do.
Water Supply Works	Dungannon (Ireland) Joint Comm.	J. H. H. Swiney, Civil Engineer, Avenue Chambers, Belfast	do.
Macadam	Kettering U.D.C.	T. R. Smith, Surveyor, Market-place, Kettering	do.
Sewers, &c. (2½ miles) Keity	Dunfermline District Committee	Kyle & Co., Civil Engineers, 13, George-street, Edinburgh	do.
Slag Road Metal	Witham U.D.C.	W. B. Blood, Council Offices, Witham	do.
*Quarter Sessions and Police Court Buildings, &c.	County Borough of Sunderland	W. & T. R. Milburn, Architects, 25, Fawcett-street, Sunderland	do.
*New Electric Power Station	Sheffield Electric Light Committee	Engineer, Electric Supply Department, Commercial-st., Sheffield	June 30
Road Works, Newton, near Mansfield	Blackwell R.D.C.	H. Silcock, Surveyor, 67, Westgate, Mansfield	do.
Refuse Destructor	Worthing Corporation	F. Roberts, Civil Engineer, Town Hall, Worthing	do.
*Iron Staircases at Edmonton Workhouse	Strand Union	Clerk of the Guardians, 15, Henrietta-street, Covent Garden, W.C.	do.
*Cleaning Painting, &c., of Town Hall	Fulham Borough Council	Council's Surveyor, Town Hall, Fulham	July 1
*Making-up and Paving Kelvedon-road	do.	do.	do.
*New Church, Walton-le-Dale	The Building Committee	The Vicarage, Walton-le-Dale	do.
Sewerage Works	St. Columb (Cornwall) R.D.C.	R. H. Worth, Engineer, George-street, Plymouth	do.
*Sewers Works	Watford U.D.C.	Offices of the Council, 14, High-street, Watford	do.
*Furnishing of Schools at Parkeston	Ramsey School Board	J. W. Start, Architect, Colchester	do.
*Pipe Trenches, &c., at S. W. Hospital, Stockwell	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	do.
*Roadmaking in Townsmead-road, &c.	Borough of Fulham	Borough Surveyor, Town Hall, Fulham, S.W.	do.
*Two-storey Building	J. Robertson & Sons	T. George & Son, Old Square, Ashton-under-Lyne	July 4
*New Orphanage	St. Pancras Female Orphanage, &c.	S. G. Goss, Architect, 3, Broad-street-buildings, E.C.	do.
*New Coast Guard Buildings, West Bay	Admiralty	Superintendent Civil Engineers, H.M. Breakwater, Portland	do.
*New Cottage and Alterations to Police Station	County of Southampton	County Surveyor, The Castle, Winchester	do.
Station Buildings, Leith, N.B.	Caledonian Railway Co.	J. Blackburn, 302, Buchanan-street, Glasgow	July 6
*Hot-water Warming Apparatus	Middlesex Asylum Visiting Commit.	Clerk to the Napsbury Asylum Committee, Guildhall, Westminster	do.
*Additions to various Depots	Hornsey U.D.C.	Council's Engineer, 99, Southwood-lane, Highgate, N.	do.
*Asphalte Paving, Windsor-place, &c.	Borough of Paddington	Borough Surveyor, Town Hall, Paddington	do.
*Five Dust Vans, &c.	do.	do.	do.
*Making-up, &c., Lauderdale-road, &c.	do.	do.	do.
*Alterations to 403-409, Mile End-road	Whitechapel Union	Office of the Guardians, 74, Vallance-road, Whitechapel, E.	do.
*Enlargement of Post Office, Portsmouth	H.M. Office of Works	The Postmaster, Post Office, Portsmouth	July 7
*Making-up Roads	Leyton U.D.C.	Council's Surveyor, Town Hall, Leyton, E.	do.
*600 feet Weldless Steam Pipes	Acton U.D.C.	Surveyor to the Council, 242, High-street, Acton, W.	do.
*Quenast, Guernsey, &c., Granite	Borough of Kingston-on-Thames	Borough Surveyor, Clattern House, Kingston-on-Thames	July 8
*Block of Tenement Dwellings, Edgware-road	Metropolitan Borough of Marylebone	Town Hall, Marylebone-lane, Oxford-street, W.	do.
*Four Blocks of Dwellings in Fulford-street	Metropolitan Borough Bermondsey	Town Clerk, Town Hall, Spa-road, S.E.	July 14
Four Houses, Settle-street, Milton	.....	J. H. Key, Salthouse-road, Milton	No date.
Business Premises, Oxford-place, Norwich	Mr. C. Larking	O. Bond, Architect, 15, Upper King-street, Norwich	do.
Twenty Coke Ovens at Collieries, West End, Batley	.....	T. H. Brierley, Batley	do.
Deepening Shaft, &c., Northawran, Yorks.	.....	Walsh & Nicholas, Architects, Halifax	do.
Additions to Office, St. Peter's Close	Wolverhampton Guardians	T. Harrison, Union Offices, Wolverhampton	do.
*Roller Blinds at Cottage Homes, Croydon	St. Olave's Union	Clerk to the Union, Union Offices, Tooley-street, S.E.	do.
*Restoration of St. James's Church	Church Restoration Committee	Arnold, Baker, & Day, Solicitors, The Precincts, Rochester	do.

[See also next page.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Assistant Civil Engineers (H.M. Naval Establishment)	Council Select Committee	Not stated	July 2
*Surveyor to Inspect Elementary Schools	Staffordshire County Council	300l., &c.	July 15
*Teacher or Master of Painting School	Nat. Assoc. Master House Painters, &c.	Not stated	No date.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. & xxiv. *Public Appointments*, xxi.

PRICES CURRENT (*Continued*).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Fitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	. . .
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
" " galvanized	16 0 0	. . .
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	. . .
" " to 24 g.	10 15 0	. . .
" " to 26 g.	12 5 0	. . .
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.	14 5 0	. . .
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	15 0 0	. . .
" " 22 g. and 24 g.	16 10 0	. . .
" " 26 g.	18 0 0	. . .
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	. . .
" " 20 g. and 24 g.	12 15 0	. . .
" " 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in. (Under 3 in. usual trade extras.)	9 5 0	9 15 0

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 2 6	. . .
Pipe in coils	14 12 6	. . .
Soil pipe	17 2 6	. . .
Compo Pipe	17 2 6	. . .
ZINC—Sheet—		
Vieille Montagne ton	27 5 0	. . .
Silesian	27 0 0	. . .
COPPER—		
Strong Sheet per lb.	0 0 10½	. . .
Thin "	0 0 11½	. . .
Copper nails "	0 0 11	. . .
BRASS—		
Strong Sheet "	0 0 10	. . .
Thin "	0 0 11	. . .
TIN—English Ingots "	0 1 5	. . .
SOLDER—Plumbers' "	0 0 6	. . .
Tinmen's "	0 0 8	. . .
Blowpipe "	0 0 9	. . .

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	2¾d. " "
21 oz. thirds	3¼d. " "
" fourths	3½d. " "
26 oz. thirds	4d. " "
" fourths	4¼d. " "
32 oz. thirds	5d. " "
" fourths	4½d. " "
Plated sheet, 15 oz.	3d. " "
" 21 oz.	4d. " "
Harley's Rolled Plate	13d. " "
¼ " " "	2d. " "
½ " " "	2½d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 2 2
" " " in drums	"	0 2 6
Boiled " " in pipes or barrels	"	0 2 5
" " " in drums	"	0 2 9
Turpentine, in barrels	"	0 3 6
" in drums	"	0 3 9
Genuine Ground English White Lead	per ton	20 10 0
Red Lead, Dry	"	20 0 0
Best Linseed Oil Putty	per cwt.	0 2 0
Stockholm Tar	per barrel	1 18 0

PRICES CURRENT (*Continued*).

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

A. H.—J. S. M. (Amounts should have been stated.)

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays*. N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

CORK.—For rebuilding portions of premises, Nos. 65, 66, and 67, Patrick-street, Cork. Mr. Arthur Hill, architect, 22, Georges-street, Cork:—

	For Woodford, Bonne, & Co.	Guy & Co.
Hegarty & Sons	£2,000	£270
Delany & Co.	1,900	280
Wm. O'Connell	1,700	225
E. & P. O Flynn	1,696	225
S. Hill*	1,650	225

COVENTRY.—For additional power-house, The Butts, for Messrs. Alfred Herbert, Ltd., machine tool makers. Messrs. Tait & Herbert, architects, Leicester:—

J. Holmes	£1,098	Kelley & Son	£907
R. Wootton	993	Hancox & Co., Coventry*	905
Scurr & Jowett	943		
C. Garlick's Exors.	930		

ENFIELD.—For the erection of a terrace of houses in Lincoln and Clive roads, Enfield, for the Freehold and Leasehold Investment Co. Mr. E. C. Beamont, architect, 78, Fleet-street, E.C.:—

A. H. Jones* £9,360

FOLESHILL.—New messroom and extension to pattern shop at Edgewick Foundry, for Messrs. Alfred Herbert, Limited, machine tool makers. Messrs. Tait & Herbert, architects, Leicester:—

	Messroom.	Pattern Store.
R. Wootton	£760	£390
Hancox & Co.	580	225
J. O. Jewsbury	549	420
C. Garlick's Executors	545	215
Kelley & Son, Foleshill*	545	208

HOLBEACH.—For additions to workhouse infirmary, for the Guardians. Mr. F. Burdett Ward, architect, Wisbech. Quantities by the architect:—

Pattinson & Son	£3,594 0	R. Shanks	£3,239 0
Hinson & Co.	3,470 0	Bateman & Son, Sutton Bridge†	3,100 0
Clarke & Sons	3,458 17	J. Guttridge	2,998 0
Rands & Son	3,300 0		

[Architect's revised estimate.. £3,061.]

† Accepted subject to the approval of the Local Government Board.

HOVE.—For the supply of materials, &c. Mr. H. H. Scott, Borough Surveyor, Borough Surveyor's Office, Town Hall, Hove:—

Street Masonry and Jobbing Works.

Parsons & Sons, Church-road, Hove, at schedule prices.

Ironmongery and Joiners' Ironmongery.

Reed & Son, North-street, Brighton, 27½ per cent. off schedule prices.

Gas and Water Pipes and Fittings.

Griffiths & Sons, Mesty Croft, Wednesbury, 42½ per cent. off schedule prices.

Paints, Varnishes, and Brushes.

W. T. Nye, Church-road, Hove, 21½ per cent. off schedule prices.

Stoneware Drain Pipes.

Staunton Colliery Pipe Co., Worthington, 52½ per cent. off schedule prices.

Hand-picked Hill Flints.

W. Hillman, North-street, Portslade, at 8s., 7s. 6d., and 6s. per yard.

J. W. Miller, Sackville-road, Hove, at 7s. 6d., 7s., and 4s. per yard.

G. H. Strivens, Shoreham, Sussex, at 8s. per yard.

External Painting of Town Hall.

Gates & Sons, North-road, Brighton £49 10

KIRKBY-IN-FURNESS. — For the restoration of St. Cuthbert's Church tower, for Restoration Committee. Mr. J. Standen-Adkins, architect, 3, Maze-road, Kew:—

		For reduced scheme,
Hatch & Sons	£520 0 ..	—
W. Waite	443 10 ..	—
J. S. Balderstone	388 0 ..	£370 0
Ashburner, Ltd., Dalton-in-Furness	389 13 ..	359 3*

LEEK.—For the erection of an electric lighting station, Station-street, for the Urban District Council. Mr. John Taylor, architect, Leek and Longton. Quantities by architect:—

Dean & Co.	£2,741	Grace	£2,490
Jos. Heath	2,602	J. Bagnall	2,403
Salt	2,555	W. Turner*	2,374
Tompkinson & Bettelley	2,513		

LLANBEDR.—For new residence at Llanbedr, for Mr. Wm. Jones, Llyngwyn Chivelog R.S.O.. Mr. R. Lloyd Jones, architect, Carnarvon:—

Jones & Co.	£1,943 0	Morgans & Williams	£1,654 0
Jones, Roberts, & Jones	1,898 0	J. Adams	1,634 0
D. J. Pierce	1,850 0	Williams & Co.	1,629 0
J. Pierce, Pencaenewydd*	1,800 0	Edwards Bros.	1,600 0
Gth. Williams	1,773 0	Lloyd, Williams, & Jones	1,598 0
David Evans	1,675 0	W. G. Evans	1,532 0
Jones & Davies	1,669 12		

[See also next page.

LONDON.—For completing the electric light installation at the public library, Commercial-road East, Limehouse, E., for the Metropolitan Borough of Stepney. Mr. W. Jameson, Borough Engineer:—

Strode & Co.	£98 0
Tamplin & Mackovski	75 0
J. C. Christie	68 15
Emerson & Sons	52 0
Ward Bros. (informal)	51 17
Barlow Bros., 237, Shaftesbury-avenue, W.C.*	42 10

LONDON.—For alterations, additions, &c., to the Hatcham Arms and shop adjoining, 92 and 94, New Cross-road, S.E. Mr. William Stewart, architect, Newlyn House, 4 and 5, Aldgate, E.C.:—

W. Gladding	£1,697	W. Wallis	£1,495
J. & H. Cocks	1,649	Todd & Newman	1,410
Harris & Wardrop	1,639	W. Irwin	1,300
Dolman & Co.	1,500	W. Nash, New Cross*	1,389

LONDON.—For repairs to the Commercial-road (E.) Station, for the London Salvage Corps. Mr. Arthur F. Briggs, architect:—

Falkner & Son	£547	Colls & Sons	£515
Mansfield & Son	540	Hayward & Son*	492
Ashby & Horner	539		

LONDON.—For alterations, &c., at Nos. 5 and 6, Halkin-street, Grosvenor-place, S.W., for the Carl Oppermann Electric Carriage Co., Ltd. Mr. A. E. Mullins, architect, 48, Peckham-road, S.E.:—

Jackson	£947	Hoare & Son, Blackfriars-road*	£668
Owers	925		
Courtenay & Fairbairn	721		

LONDON.—For the erection of 140 workmen's dwellings in Hawthorn and Beechwood roads, Hornsey, for the Hornsey Urban District Council. Mr. E. J. Lovegrove, Engineer and Surveyor, Southwood-lane, Highgate, N.:—

Abbot & Herbert	£58,725	Martin, Wells, & Co., Ltd.	£47,254
B. E. Nightingale	50,800	Hardy Bros.	46,292
Charles Wall	50,579	Shrouder & Matthews	46,200
Dearing & Son	49,975	S. Redhouse, sen.	45,153
McCormick & Sons	49,876	Lawrence & Son	44,444
Killby & Gayford	49,833	Willmott & Sons	43,084
Haines & Co.	49,349	Barker & Co., Ltd., 81, Kensington High-street*	38,900
Sabey & Son	48,515		
Peerless, Dennis, & Co.	48,428		
Johnson & Co., Ltd.	48,060		
Johnson & Son	47,884		

[Engineer and Surveyor's estimate, £40,385.]

LONDONDERRY.—For the erection of three houses, Creggan-road, Rosemount, for Mr. W. Baldrick. Mr. R. E. Buchanan, architect, Castle-street, Londonderry:—

Wm. Cooke	£420	R. Colhoun, Strand-road, Derry*	£395
A. Dunlop	435		

MEIGLE (N.B.).—For additions to the public school. Messrs. Carver & Symon, architects, 34, Castle-street, Forfar. Quantities by architects:—

Masonry.—John Howie, Alyth*	£300	0	0
Joinery.—W. McIntosh, Meigle*	219	15	0
Slating.—C. Crichton, Meigle*	38	4	5
Plumbing.—J. C. Laird, Blairgowrie*	69	17	9
Plastering.—David Masterton, Forfar*	24	0	0
Painting.—Robertson, Coupar Angus*	14	17	4

RAUNDS.—For the erection of house on the Ringstead-road, Raunds, Northants., for Mr. N. Martin. Mr. Harry Knight, architect and surveyor, Rushden, R.S.O.:—

Harrison & Winsor	£365	Smith & Son, Raunds*	£337
James Lawrence	362		

SHEFFIELD.—For the erection of six houses, Catcliffe. Mr. Edmund Winder, architect, Corn Exchange Chambers, Sheffield:—

R. Thorpe	£1,619 7 9	John Bishop	£1,274 0 0
W. Grantham	1,500 0 0	Carpenter & Co.	1,273 0 0
Lund & Swan	1,490 0 0	J. Moran	1,259 0 0
Badger & Appleby	1,421 15 0	T. Ferris, Treeton*	1,150 0 0
Grey & Son	1,370 0 0	J. Head	990 0 0
Green & Co.	1,300 0 0		

SHEFFIELD.—For altering eight houses into seven sale shops, Spital Hill, Sheffield. Mr. Edmund Winder, architect, Corn Exchange Chambers, Sheffield:—

J. & H. Wheen	£1,319 0	M. Grantham, Bernard-road, Sheffield*	£1,100 0
Green & Co.	1,273 16		
Badger & Appleby	1,230 10		
Wilkinson & Sons	1,210 0		

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Supplement to The Builder,

JUNE 20, 1903.

THE INTERNATIONAL BUILDING TRADES' EXHIBITION, ROYAL AGRICULTURAL HALL, ISLINGTON.

THE Building Trades' Exhibition which has been open during this week at the Agricultural Hall is a very good one, and is well arranged, and well and systematically catalogued. Before entering on a review of it in detail, however, there are one or two suggestions that we should like to make in a more general sense.

The promoters of the exhibition have wisely given up, as we long ago advised, the attempt to hold such an exhibition every year—an attempt which could only result in having pretty much the same exhibits for two or three years together. The last was held two years ago; but is an interval of two years sufficient? We still seem to see a great many exhibits that we saw before, or at least just the same kind of articles with the same kind of merits. Our impression is that if the period were extended to five years it would be far better for the interests of the undertaking. In five years there is time for a good many new materials or methods to have been brought forward, which would result in giving a really new interest to each exhibition. But, concurrently with that extension of the interval, there should be an extension of the time during which the exhibition is kept open. To get together such a large collection of things and only keep it open for a week is really a pity; and moreover it prevents anything like the full and considerate public criticism and public attention which would be possible if the exhibition were open for a month instead of a week. We have taken a good deal of trouble to go through and describe the exhibition in this Special Supplement; but it is certainly a drawback to feel that the exhibition must close the day after these observations are published, thereby very much detracting from any value which they may have, for readers who see something described which they would be interested in examining, have only the one final day to do it in, on which day they may be engaged, or they may not see the *Builder* till the day after the exhibition is closed. In our opinion the whole thing would be a far greater success, and of far more real value, if it were held only once in five years, and then kept open for a month.

There is a minor matter in connexion with these exhibitions which the management ought to have reformed; we refer to the persistent and irritating touting of stall-keepers all over the place. No sooner is a visitor observed to look at anything with interest, and to be making a memorandum in his catalogue, than there are people at all the other stalls within sight, on the *qui vive* to buttonhole him and insist on the special excellence and value of their exhibit, and thrust their papers and prospectuses into his pockets. "The only perfect spring hinge made," said one exhibitor to a visitor. "That cannot be," was the reply, "as I have just been shown that at the other side of the Hall." This sort of thing does no good, if exhibitors would only believe it, since there are few visitors indeed who are so simple as to accept an exhibitor's valuation of his own work; it is very bad taste; it is calculated to drive people away; and it turns the whole show into a kind of hugh advertisement or bazaar, whereas it might be something better than that. To have some one there to explain things when asked is perfectly right and sensible; but attendants should be taught to wait till they are asked, and not beset visitors with information which they may be in no need of and papers which they do not want to read. If the managers of the exhibition took a strong line on this matter, and insisted that exhibitors were not to force themselves on the visitors, but to confine themselves to answering questions and giving information when asked, they would certainly raise the tone and character of the exhibition, and remove it more from the status of a bazaar.

In reviewing the contents of the exhibition, we have as far as possible classified them under certain comprehensive headings, adding a miscellaneous section for some things which could not well be classified.

OPENING OF THE EXHIBITION.

THE exhibition was opened on Saturday last week, the 13th inst., by an informal luncheon. The chair was occupied on the occasion by Mr. H. Greville Montgomery, and among those present were Colonel Edis, C.B., and Messrs. W. E. Riley, Superintending Architect of the London County Council, Max Clarke, H. O. Cresswell, Paul Hasluck, P. L. Marks, Ellis Marsland, Arnold Mitchell, E. R. Robson, E. O. Sachs, C. H. Shoppee, Lewis Solomon, B. Tabberer, and others—the company numbering about fifty.

After luncheon the toast of "The King" was honoured, following which

Colonel Edis proposed the toast of "The Chairman and Host, Mr. Montgomery." All those present were more or less interested in an exhibition such as that which had just been arranged, and Mr. Montgomery deserved their best thanks for organising such a successful exhibition. It was a matter of some importance to the profession which he followed that there should be brought together now and then a collection of the newest materials and appliances connected with the building trade which could be seen *coup d'œil*. In referring to the clay-working industry, the speaker said he had, during the course of a long practice, done all he could for the worker in clay. He was one of the first to use terra-cotta on a large scale, and he held the same opinion now in regard to terra-cotta that he did when he first commenced to use the material. He thought it was one of the best materials to use in large towns, especially if water were used now and then to clean the substance and restore it to its pristine state. He hoped the exhibition would be as successful as it deserved to be: all of them could learn something from such an exhibition by walking through it.

The toast having been honoured,

Mr. Montgomery, in response, said he could have no better patrons of such an exhibition than architects and surveyors, and he was glad to see so many members of those professions present. He thought he might say that the present was the finest exhibition of the kind yet held. This year there was an art gallery, which was under the direction of Mr. Gilbert Wood, and a number of interesting drawings had been brought together. There was also a collection of Irish minerals which had been sent by the Department of Agriculture for Ireland—a very fine exhibit, which was placed in the small hall because the application for space was received too late to make it possible to arrange for the exhibit in the large hall.

The proceedings then terminated.

THE IRISH GOVERNMENT EXHIBITS.

A prominent feature in the exhibition is the large collection of Irish building stones, marbles, slates, pottery, and other building materials, which may be found in the Minor Hall. The collection has been formed by the Department of Agriculture and Technical Instruction for Ireland, and is very complete. For some time past the Irish Government has been working hard to make known to architects, engineers, and builders the great richness of the country in building stones and marbles. There has been a permanent collection of these materials in Dublin for several years, but it was thought that they might be brought more into the light. The Government arranged a fine collection in Glasgow at the recent exhibition, also at Cork, and a few months since at the Imperial Institute. The authorities have evidently come to the conclusion that the Imperial Institute is in rather a secluded position for building materials to be easily visited by business men, so they decided to send the collection as it stood (with a few exceptions) to the Agricultural Hall. They could not have done better.

The one disappointing feature is that the specimens are not described at any length in the catalogue, though the courteous gentleman in charge is a mine of information. The special catalogue is meagre in the extreme. The department is evidently under the impression that these stones and slates can speak for themselves, and so they can to the expert, but not to the public. Particulars concerning price, and other business matters, are rightly regarded by the Irish Government as no concern of theirs, but they arrange that all inquiries shall be forwarded to the various exhibitors. The object of the exhibits is, confessedly, to promote a greater sale of Irish building materials in England, and the aim of the Government is, therefore, a purely commercial one—to assist the Irish stone and marble industry.

It is singular that whilst so little has been written, in book form, on the building stones of England and Scotland, there is quite a large literature on Irish stones. Unfortunately that literature is chiefly of a geological nature, and not of much use either to architects or builders. This collection at the Building Trades' Exhibition will do much to bring those interested in touch with what cannot be ascertained from books. There is no collection of Irish building stones in London, and, probably, in England that is so complete or up-to-date.

The granites of Ireland have long been located, but the bulk of them are not at all well known. Newry, Donegal, Wicklow, Wexford, Galway, and other districts produce some of the best granites that are to be found in the United Kingdom. Amongst those represented in the exhibition are the dark grey granite of fine grain from the quarry of the Earl of Annesley, at Castlewellan, Co. Down; a polished slab of light grey hornblende-granite, also of fine grain, from the Moor Quarries, Newry, worked by Messrs. Campbell, Hugh, & Son; the Carlingford Granite Co. show a polished slab of coarse-grained dolerite; the material is principally used for paving purposes; a beautiful stone is the light pink granite from Shantalla, Co. Galway; it has white phenocrysts of orthoclase felspar, the polished slab and pillars showing the material to great advantage. The Congested Districts Board have some polished samples of Barna (Co. Galway) granite, in which phenocrysts of pink orthoclase occur in a dark ground mass; the department of Agriculture exhibit a polished sample of dark green granite (dolerite) from Rostrevor; this material is quarried principally for road metal in the district; samples of polished and

rough granite of light grey tint and fine grain are shown by Mr. Chas. Ewan, from Newry; the South County Granite quarries of Carlingford send samples of paving setts apparently containing much hornblende, it is also used as road metal; a medium grained grey granite comes from Ballyknocken, co. Wicklow; and samples of light grey Newry granite are shown by the United Newry Granite Co. and Mr. W. J. Sturgeon. A striking granite is that from Glendoan, Carrickbrack, co. Donegal; it is light grey, with phenocrysts of yellowish-grey orthoclase; the slab shows the material in three dressings—namely, polished, axed, and rough.

A large number of slates are shown in this Irish exhibit; they are principally blue-black in colour, and for the most part look like serviceable materials. The Killaloe Slate Co.'s quarries are worked in strata of Lower Silurian age. According to Professor Hull, they lay open a vertical section of over 350 ft., and produce slates from 10 ft. square downwards, of a dull bluish grey colour and good quality, though somewhat rough. The examples in the exhibition do not exhibit much roughness, however. The Valentia slates, which are also represented, come from the Devonian beds; they are blue-black, but possess a slight green tinge. Other slates come from several localities in co. Cork and Waterford, and some from Kerry and Wexford. A curious slate, of olive green tint, is shown by the Victoria Slate Co., from Carrick-on-Suir, and a slab of light green slate comes from near Pilltown, co. Waterford.

The limestones of Ireland are very largely represented in the collection, but there is no necessity to describe them in detail. For the most part they are light and dark grey Carboniferous limestones of a crystalline character, and very durable. The Carboniferous limestone occupies a great portion of the surface of Ireland, and the formation is remarkable for its uniformity in grain and appearance over large areas. We do not mean to convey that the quality of the stone is the same throughout, nor that the colour is always uniform when traced over several miles; but there is a general similarity in these Carboniferous limestones over the country. Light bluish-grey in the rough, they become much darker when polished as may be clearly seen in many of the large worked blocks in the exhibition. The principal localities represented are at Mount Nugent, Aherla, Finglas, Longford, Bagnalstown, Ballisodare, Midleton, Skerries, Kinarla, Nenagh, Foynes, Navan, Dromana, and Ballinasloe. One of the most striking examples of these hard, grey limestones is that exhibited by Lord Monteagle, from Foynes, co. Limerick. It is a rough block in which a Celtic device has been carved.

Other limestones are exhibited to show the kind of materials from which some Irish lime is derived. They come chiefly from the north of Ireland, and some from co. Antrim remind us of the indurated chalk of that district. The chalk has been hardened by the intrusion of immense masses of igneous rock, chiefly basalt, and much of the limestone is almost crystalline by reason of the metamorphism.

The Irish exhibit is rich in marbles, as may have been expected. We do not intend to describe these in detail, however, as they are for the most part, if not entirely, the same specimens as were shown at the Glasgow Exhibition, and we gave a full description of them at the time they were at the last-mentioned city. The Connemara green is present in many fine slabs and other specimens. We had an opportunity not long since of visiting the principal quarry from which this beautiful marble is obtained, above the station of Recess in Co. Galway. The stone is cut, by means of wire, from the face of the quarry; it is not blasted, and every care is taken to select the patterns of the stones, of which there are an infinite variety. Cut in one direction, this ophicalcite marble is seen to be much contorted; in another direction plain light green streaks alternate with white, and so on. The stone is let down the hill-side by wire rope. This, which is probably the most characteristic of Irish marbles, and is certainly the best known in England, is practically unique in Great Britain, though we have seen some smaller quarries in other parts of Galway in similar material. It is not that we have no other ophicalcites in the country, but most of the latter have a tendency to be hard and flinty, and are otherwise objectionable. The most striking example of this green Connemara marble we have seen occupies a prominent place in this exhibit.

Mr. E. S. Glanville, of Dublin, has a good exhibit of Irish marbles in large mounted slabs and in polished columns, including Galway black, Irish green, Cork red, Midleton red, pink, and dove, Erne fossil, Castleisland red, Clonowen fossil, specimens of mosaic in Irish and Italian marbles, a polished block of Dalkey granite, Donegal red granite, and several other stones used for decorative purposes. Mr. Richard Colles, of Kilkenny, shows amongst other marbles some slabs and columns of Irish black, black fossil, dark grey, Irish grey, Cork red, and a specimen of Irish limestone showing different styles of dressing and carved Celtic interlacing. Of the foregoing the black marbles from Galway and Kilkenny are, perhaps, the most remarkable. The Kilkenny marble takes a beautiful polish, and when first cut is quite black, but when the quarry water has disappeared white sections of fossils come to light. The Galway quarries are at Menlough and Angliham along the shores of Lough Corrib. Blocks of 12 ft. to 14 ft. long and 4 ft. to 5 ft. wide, and about 1 ft. in thickness, are raised. Mr. Canty, of Michelstown, shows some black and white marble of that district, and there is a sample of dark grey marble from Midleton, Co. Cork, which takes a fine polish. The Congested Districts Board exhibits a specimen of Letterfrack white marble carved to show what the material is capable of. Judging from our experience of the stone on the spot, it seems to be a white marble of the Carrara character, but rather hard and with some extremely light veining. This rock is well worth further investigation. Mr. J. Rohan sends a sample of Ballinacurra red marble in the rough, whereby we do not get much of an idea of its qualities as an ornamental stone.

Several sandstones and freestones are shown, and there is a large collection of building stones from the different counties of Ireland, lent by the Council of the Royal College of Science, Dublin. There is nothing much to say about these latter. They are mostly of unknown origin so far as actual locality is concerned, and they form part of an old collection. It is probable that the majority of these stone cubes have come from quarries long since extinct, or are merely samples of surface stone sent for exhibition by the proprietors of estates with a view to attract attention to them. The various divisions of the Carboniferous have afforded most of these sandstones and freestones, especially, in regard to sandstones, the Millstone Grit and Coal Measures. The sandstones shown, outside the College of Science collection, are chiefly of a light brown tint, and are of light grain. They come from different localities in Leitrim, Tyrone, and Donegal.

The flags and flagstones are also of Carboniferous age, and are chiefly of bluish and light brown tints. They seem to be serviceable enough, and are fair stones of their kind. The principal exhibit in this connexion is that of Messrs. G. A. Watson & Co., of Liscannor, Clare, called "Shamrock" stone, which comes from the Carboniferous Millstone grit, and is used for landings, kerbing, channelling, steps, &c. It is a grey stone of very fine grain. The quarries are situated about 700 ft. above sea level. The top stone is without any visible signs of bedding, and is utilised for setts, kerbs, and as blocks for dock and bridge work. The stone below is bedded, and produces flags, landings, steps, &c. Resistance to crushing strength, as tested by Messrs. Kirkaldy & Son, is given as follows:—4-in. cubes in the rough were tested, and of three samples one came out at 2,214·5 tons per square ft., another at 1,782·3 tons per square ft., and the lowest at 1,711·8 tons per square ft. The chemical composition of "Shamrock" flagging is:—

Silica	84·90
Alumina	6·60
Iron oxide	3·60
Manganese oxide	·65
Lime	·90
Magnesia	1·26
Sulphuric acid	trace
Alkalies, &c.	·39
Water	1·70
	100·00

The specific gravity of the stone is 2·7.

The Irish collection at the exhibition also contains much paving material and macadam. Of these, all we need say is that close-grained granites and diorites seem to be chiefly employed for road materials, and that the flags are mainly of sandstone. Rocks suitable for surveyors' purposes are scattered all over Ireland.

A novel departure for a British Government Department is the testing of clays for the manufacture of bricks, tiles, terra-cotta, &c. The actual clays are not in the exhibit, but the samples have been sent to the Department and are now in process of being tested. However, many of the tests are now complete. The first series of articles made from the clays sent include domestic ware from Viscount Bangor's estate at Downpatrick. Some excellent results in terra-cotta have also been obtained from these clays and from some at Drogheda. A clay suitable for making faience has been found at Ballymacadam, near Clonmel, and china ware has been made from the Rostellan clay, of Aghada, Co. Cork.

The exhibit also includes some carefully-executed work in terra-cotta, bricks, pottery, della robbia ware, &c., all made from Irish clays. A particularly fine panel in red, carved, is an example of the work turned out by the Arklow Terra-cotta Brick and Tile Co.; and there are many other well-executed panels, chimney-pots, vases, domestic ware, and ornamental tiles, &c., in claywork from different parts of Ireland.

Only one exhibit of cement is shown, but it is a good one. It is sent by the Irish Portland Cement and Brick Co., of Dublin. It includes the cement as well as the raw materials from which it is manufactured. There are also some sands, a few of which are suitable for the manufacture of white glass, though we are afraid that so far as the glass industry is concerned, the deposits from which they came will mostly have to remain where they are for the present. Others are good builders' sands.

We cannot conclude this brief review of the Irish Government exhibit without expressing our opinion that the proprietors of stone and clay industries in Ireland are much to be congratulated for assisting the Agricultural Department in getting such an excellent collection together. Few English architects and builders know anything about the wealth of Ireland, in regard to the great variety of stone, marbles, and slate contained in the country, and such an exhibit as this cannot fail to be productive of much good.

In the Minor Hall there is an exhibit of the well-known "petit granit" from Belgium. This stone is light blue in colour, and is raised from the Carboniferous limestone series. It is extensively employed in Belgium for building purposes, pavements, bridge and harbour work, &c. It weathers well, and has a great reputation. The exhibit consists of a square fluted column surmounted by a carved cap, and some photographs of buildings in which the stone has been employed. The quarries are at Soignies and Ecaussines. Everybody who knows Belgium is acquainted with this stone, and there is hardly any important building in that country constructed in recent years that is not made of the Carboniferous limestone of the Ardennes, of which these stones from Soignies and Ecaussines are fine examples. Six thousand three hundred people are employed in and about the quarries.

The Basaltine Stone Co. have a number of their specialities in flagging, armoured kerbing, and channelling, sewer and water conduits, &c. In regard to the kerbing, the top face is also bevelled to suit the fall of the pavement. The egg-shaped conduits are made in sizes varying from 12 in. to 8 in. internal section, to 60 in. by 40 in. internal section. The Empire Stone Co., of Leicester, show a doorway entrance and two windows to imitate yellow Mansfield and Portland stone, together with flights of steps, flagging, and flooring. The British Paving and Granite Co. exhibit granite setts from Norway, Sweden, Wales, and Ireland, as well as dock-coping, macadam, &c.

The Enderby and Stoney Stanton Granite Co. have erected a small office, around which specimens of the stone are shown. The granite is dressed in the form of spur stones, kerbs, channels, and there are some setts, broken granite, and chippings. This material is too well known in London to need description.

The Hopton Wood Stone Co., of Wirksworth, in Derbyshire, have an exhibit of road-metal, kerbing, and specimens of paving and dressed stonework. This is a Carboniferous limestone—one of the few supplied in this country both rough and polished. It is very durable, and is extensively employed.

There is a selection of stones exhibited by the "Quarry," all well known; and some samples of marble shown by the Equi Valley Marble Co., of Massa Carrara, Italy. One slab resembles the veined Sicilian, and others are breccias of some merit.

Messrs. William Griffiths & Co., of Hamilton House, Bishopsgate-street-without, E.C., show some excellent specimens of broken granite, setts, and kerbing from Guernsey and the Griff (Leics.) quarries, as well as setts from Norway and timber from Western Australia. The Hard York "Non-slip" Stone Co., of Halifax, have erected a small office in one of the bays in the gallery, and have put down some pavement, as well as erecting some stairs, &c. This artificial stone is light grey in tint, and looks remarkably well. The well-known Imperial Stone Co. have laid down some pavement, and there is a length of balustrading, some moulded and other work. Mr. James Runnalls, of Penzance, exhibits some specimens of Penlee stone. This stone is also well-known, and has been on the market in the West of England for many years. It is a basalt, and has a good reputation for its wearing qualities on roads. Messrs. Mackay & Davies, of Craig-yr-Hesy quarries, Pontypridd, show some samples of blue Pennant stone, flagging, setts, &c. The Pwllheli Granite Co., of Runcorn, have some samples of granite paving setts, channels, kerbs, &c. This stone has proved very useful for surveyors' purposes. It is compact, fine-grained, contains many small phenocrysts of triclinic felspar, some black mica and hornblende, and is not appreciably porous.

The Patent Victoria Stone Co. have a neat exhibit in a corner of the gallery. It consists of a large doorway supported by columns and carved caps in Victoria stone, trusses, cornice, &c. There is a short length of balustrading with vases at each end, also a moulded, bracketed, staircase, and a carved panel. This stone can now be produced in almost any tint desired, and there are several samples to illustrate this fact. The floor of the exhibit is laid with slabs of the stone, and there is one showing the adaptation of the material for stable-flooring purposes. One slab shown was laid down on London Bridge fourteen years ago, and does not seem much the worse for wear. The stone is a mixture of washed and crushed granite and cement carefully prepared, and steeped in a solution containing much colloid silica. Other qualities of the stone are hardened by being submerged in tanks containing water.

The Patent Indurated Stone Co., of Millwall, exhibit some slab paving, sewer-tubes, moulded steps, grooved paving, &c. All these materials appear to be serviceable, and they have been tested by time in most cases.

OTHER EXHIBITS OF BUILDING STONES.

The exhibition is not very rich in building stones beyond those already described. Amongst the others, however, we may mention the stone from Weldon, in Northamptonshire. This stone, although used by architects during the Elizabethan period (and before), has not been much employed since except during the last few years. The excellent preservation of Kirby Hall, which is built of Weldon stone, seems to have attracted attention to the material, and the late Earl of Winchelsea caused quarries to be opened up near by. From a small beginning these quarries have now attained to considerable proportions, and the stone seems to be one of the best of the Lincolnshire limestone series. The exhibit at the Agricultural Hall is modest; it consists of a dated stone from Kirby Hall and large samples of the cream-coloured oolite now raised.

Another stone from the Lincolnshire Oolite formation which caught our attention was from Castle Blytham in the same district. The "bottom stone" is of light cream colour and very fine grained; large oolitic granules are scattered about amongst extremely small ones, and the whole are cemented together by calcium carbonate in a crystalline condition. The stone takes a fine surface and is devoid of large shells. It has been largely used for building purposes in the Midlands, especially at Leicester, Peterborough, Nuneaton, &c.

Clee Hill has provided samples of basalt road metal, sent by the Clee Hill Dhu Stone Co., and by the proprietors of the Titterstone quarries. This basalt has been used for many years by surveyors for macadam, setts, &c. It is a dark grey, and appears to be composed of hornblende and triclinic felspar. It breaks with a hackly fracture. The base of Clee Hill is composed of Carboniferous rocks, and this basalt rises through them. The hardness and toughness of the basalt which caps the hill has led to the preservation of the latter. The specific gravity of the stone from the Dhu Stone Co.'s quarries is 2·88, and the resistance to crushing of three specimens of the stone, each 1½-inch cube, came out at between 47,000 lbs. and 49,000 lbs.

The quarries at Rowley Regis are also represented. The Rowley Regis Granite Quarries, Ltd., have specimens of kerbs, setts, macadam, and coarse and fine chippings. The stone is a basalt, dark grey in colour, and is stated to have a mean crushing strength of 2,049·8 tons per square foot.

BRICKS, TILES, TERRA-COTTA, ETC.

Most of the well-known manufacturers of bricks, tiles, terra-cotta, sanitary ware, &c., are exhibiting, but there is not much to be said about each exhibit. You see a great number of red, yellow, and buff bricks on ever so many stands, and though the exhibitor tries to make you believe that his bricks are a better colour than his neighbour's, he does not always succeed in convincing you. There are many stands in this exhibition so much like one another that a separate description would be useless. Firms who always exhibit, like Messrs. Broad & Co., Candy & Co., Carter & Co., S. and E. Collier, Colthurst, Symons & Co., Mark Gentry, Gibbs and Canning, George Jennings, J. Knowles & Co., H. J. & C. Major, Stanley Bros., Peter Wood, and Wragg & Sons, send up what are practically their stock in trade, so far as that is compatible with a small exhibit. We do not intend to mention these in detail.

Messrs. Candy & Co. have erected a covered stand in which are numerous glazed and other bricks, together with an assortment of the goods made from their excellent clays at Bovey Tracey. The "vitrified granite" bricks, including the Olympia paving bricks (fig. 1),

Fig. 1.

from this firm's yard prove to be capable of withstanding a crushing strength of 445·2 tons per sq. ft. Their glazed socket pipes have resisted a bursting pressure of 100 lb. per sq. in., and the pipes did not break. The chemical analysis of the raw clay is as follows:—

Silica	77·30
Alumina	16·60
Iron peroxide	1·90
Lime and magnesia	traces
Loss	4·20
	100·00

The proprietors of the Marland Stoneware Brickworks, of Torrington, North Devon, have erected a doorway in their material, which latter is of cream stone tint. It is very effective, and the few ornamental stones also forming part of the exhibit show what can be done with the little known clays of the north of Devonshire. Impervious buff facing bricks, vitreous stoneware paving bricks, damp and acid proof bricks, as well as engineering and sewer bricks, are made by the firm, and they look clean and serviceable. The results of a test as to crushing strength on six buff bricks, wire cut, show, on the average, 706·1 tons per square foot. The absorption of water by three of these bricks came out at ·74 per cent. Buff bricks wire cut, made by the same firm, show a crushing strength of 784·4 tons per square ft., and an absorption of 2·50 per cent.

Messrs. Perrett Bros., of Cheam, have a stand showing what can be done with the clays of the Woolwich and Reading series. The goods are of excellent colour and make, and consist of red finials, chimney-pots, and much decorative work, all well executed. The Ames Crosta Sanitary Engineering Co. show their characteristic materials, as do the Albion Clay Co. The Aylesford Pottery Co. have a nice exhibit, consisting of gault bricks and plum-coloured roofing tiles and fittings. Their white pressed gault bricks have shown a crushing strength of 243 tons, the mingled wire-cuts 232·2 tons, and the pink wire-cuts 184·9 tons, when tested between pieces of pine ¾ in. in thickness.

Bridgwater tiles are well in evidence, and Somerset generally has made some excellent contributions in clay goods to the exhibition. Mr. Mark Gentry, of Sible Hedingham, in addition to his usual display of red bricks, moulded bricks and ornamental red clay work, has a novelty in the shape of a black brick. The brick is not black throughout, only on the surface; it is red within. This material is not intended for paving purposes or to supersede the Staffordshire blues, but for ordinary building purposes. The proprietor prefers to keep the nature of the colouring matter a secret, and we are told that this method of making bricks black externally was discovered by him accidentally. Hamblet's Blue Brick Co. have an exhibit of their blue bricks, &c.

CEMENT, TIMBER, ETC.

Raw cement is practically absent from the exhibition so far as we could see. Its use in making drain pipes is exemplified by one or two exhibits, and mixed with basalt chips and trass, it is shown in the gallery where some sewer pipes of the material are shown.

There are some exhibits of raw timber, and though they for the most part show timber of excellent quality, there was nothing attached to the boards and slabs at the time of our visit to explain what they were. This is a great mistake on the part of exhibitors. The name of the firm does not describe the kind of wood. Some well-known firms, however, are exhibiting, like Messrs. C. B. N. Snewin & Sons, Oliver & Sons, C. E. Johnson, W. & J. R. Hunter, and Cobbetts. This part of the exhibition, although not specially attractive to the public, is very interesting to those who have studied the increasing number of useful woods imported in this country.

MACHINERY.

In dealing with machinery and mechanical appliances at the International Building Trades' Exhibition, the endeavour will be made to notice the various exhibits, as far as possible, in consecutive order and to preserve a general classification. This is a little difficult, because several firms are makers of appliances which come under different departments of work. The following are the chief heads under which the principal exhibits are mentioned:—(1) Woodworking machinery; (2) Engines and motors; (3) Machinery for dealing with water and sewage, and sanitary appliances; (4) Appliances and plant for hoisting and transport; and (5) Concrete mixers and clayworking machinery.

In the first of these sections, Messrs. J. B. Stone & Co., of London, have a large selection of woodworking machinery, including the well-known "Fox" universal trimmer, which is shown in several sizes, from small machines of 8-in. stroke, suitable for fixing to any bench, to machines of 24-in. stroke, provided with independent cast-iron stands. They also exhibit a chain saw mortiser, requiring no core driving, with a capacity from 400 to 800 mortises per hour. On the same stand we noticed a very handy setting machine for band-saw blades, a machine capable of setting an ordinary saw in from three to five minutes, without removal from the machine, or at the bench, as desired. The teeth are set, one in either direction, by two hammers, which are pressed by the same spring and strike with equal force at the same instant. The saw passes through a spring-pressed vice, the jaws of which hold it firmly, but yield when the saw is fed or drawn upward. If the saw be of uneven temper, it is simply necessary to adjust the movable stops; the amount of set is in view of the operator all the time, and can be increased or diminished by turning thumb-screws which regulate the force of the blow or travel of the hammers. Messrs. R. Becker & Co., of London, provided for inspection a comprehensive assortment of Kiessling's woodworking machinery, including saw-benches, band-sawing machines, panel planing and thicknessing machines, four-cutter moulding machines, boring and mortising machines, tenoning machines, and lathes. One of the most generally useful appliances on this stand is a universal planing, jointing, and moulding machine, with attachments for moulding, boring, and slot mortising, and for square turning and ornamental work. Among the

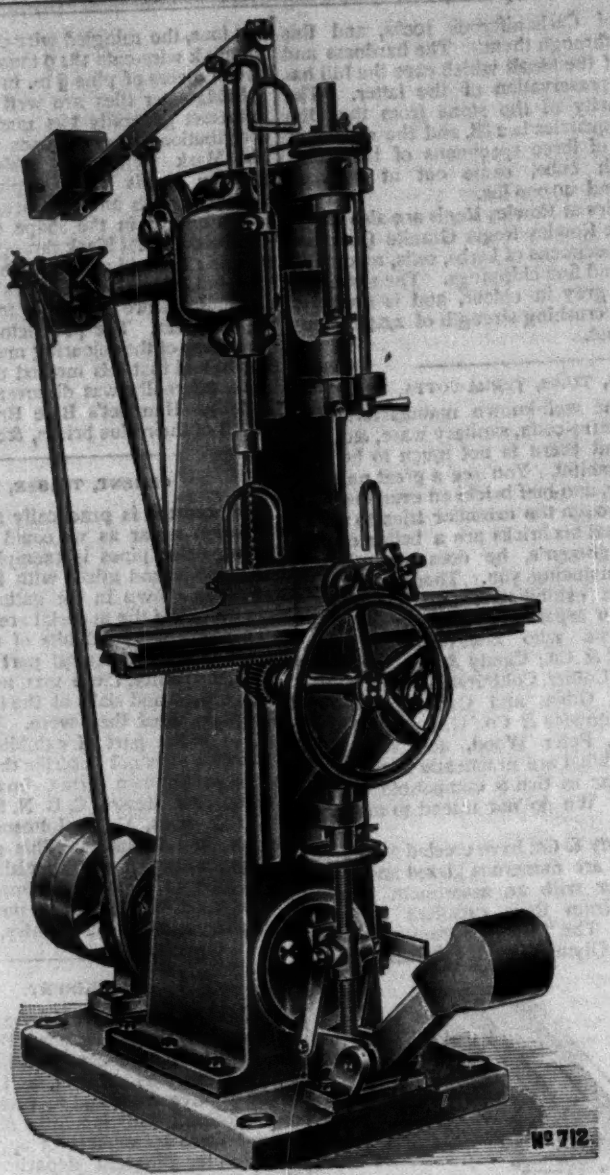

Fig. 2.

various types of woodworking machinery exhibited by Messrs. J. Sagar & Co., of Halifax, attention may be directed to a new pattern high-speed mortising and boring machine (fig. 2), with crankshaft in the base suitable for running at very high speed, this machine having an automatic reversing chisel, self-coring chisels, and taking timber up to 11 in. by 4½ in.

Mr. Monninger, of Clerkenwell, has on show several very handy tools and appliances, including a circular-saw sharpening machine, in which sharpening and gulleting are performed by an emery wheel fitted on a pivoting bracket, which can readily be attached in any desired position; also a low-priced but well-made saw bench, with rising-and-falling table and a very neat saw guard; and a wood trimmer similar to the "Fox" type, but of British manufacture. Other appliances on the same stand are tool-grinding and band-saw brazing machines, and a "Grip" tackle fixture, in which the principle of the lever is employed for the purpose of securing a firm hold for blocks and falls between two walls. Mr. Oates, of Huddersfield, exhibits a trimming machine for edging wall decorations, an ingenious contrivance which unwinds the roll of paper, cuts off one or both edges, or part of one edge, as desired, and rewinds the roll at one operation. It will trim any kind of wall papers, is self-sharpening, and can be regulated in width within customary limits.

One of the most interesting exhibits in this department of the exhibition is that of Messrs. Easton & Bessemer, of Taunton. Among other saw benches, the most noteworthy is one of the self-acting type, with a fence sliding on a strong turned steel bar at the end of table, with hand wheel and screw for fine adjustment. The fence plate is adjustable for saws of various diameters, and is provided with a lever pressure roller and weight for holding timber to the fence. The feed motion consists of a revolving drum, on which a rope coils for holding the timber into the saw. The drum is driven from the saw spindle through countershafts fitted under the bench, which are provided with speed cone pulleys so that the rate of feed can be varied from 15 ft. to 60 ft. per minute. A clutch on the drum shaft, operated by a lever, permits of the rope-feed motion being thrown instantly in or out of gear. Messrs. Easton & Bessemer's "Express" planing machine, with fixed knife, is another well-designed tool, with a massive frame of cast iron carrying the main bearings of the feed roller. The plane iron is fixed in a specially designed box, so arranged that it can be easily moved for setting or sharpening. This firm also show two steam engines. One is a horizontal compound coupled engine, with 10 in. and 18 in. diameter cylinders, 24 in. stroke, and automatic expansion governor; and the other is a vertical high-speed engine, with 6½ in. diameter cylinder and 6-in. stroke, running at 350 revolutions per minute. The latter engine is of design suitable for driving dynamos, fans, or pumps, and is fitted with governor of the Pickering type, and capable of adjustment while running. Lubrication is continuous and automatic, each bearing having a separate and adjustable feed supplied from one oil receiver placed in a safe and convenient position.

As usual in exhibitions of this kind, steam, gas, oil, or electric motors of various types are well in evidence. Messrs. Hornsby & Sons, of Grantham, exhibit a small Hornsby-Ackroyd oil engine made for working with ordinary oil or any form of liquid fuel. Messrs. Crossley Bros, of Manchester, have a fairly comprehensive collection of their well-known gas engines. The National Gas Engine Co., of Ashton-under-Lyne, exhibit an "Improved Otto" gas engine, with patent air filter and continuous lubrication. The Forward Engineering Co., of Birmingham, exhibit an 18 brake-horse-power gas engine of the "Otto" type, and a 2·5 brake-horse-power gas engine specially adapted for electric lighting, these engines being fitted with open-end porcelain ignition tubes, and devices intended to render impossible the waste of lubricating oil.

Messrs. Babcock & Wilcox, of London, exhibit models of their water-tube steam boiler, steam superheater, mechanical chain-grate stoker, and of the Guttmann water softener and heater. Among the apparatus shown by Messrs. J. B. Petter & Sons, of Yeovil, is a small oil engine burning common paraffin oil, with a consumption of about three-quarters of a pint per brake-horse-power per hour. This motor is provided with a novel system of ignition, in which the tube is heated by the exhaust gases as they pass from the engine. By this means the continuous burning of the usual Bunsen lamp is obviated. The Petter engine is well adapted for use in country houses, farms, and estates, in connexion with machinery for grinding, cutting straw, sawing timber, pumping water, and many other purposes. The stand of the Pulsometer Engineering Co., of Reading, is devoted to different forms of the Pulsometer steam pump (fig. 3), an

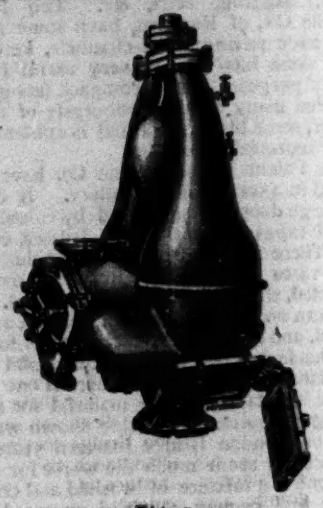

Fig. 3.

appliance generally popular among builders and contractors. For pumping out foundations, well sinking, and dealing with liquids or semi-liquids of any kind, such as mud, liquid cement, slurry, and sewage sludge, it would be difficult to find a more convenient or efficient apparatus. One exhibit shows the Pulsometer in a well section, thus making clear the simplicity of the arrangements for pumping under such conditions, no fixing and no exhaust pipe being necessary. A very handy self-contained pumping appliance for use in trenches or other temporary work consists of a pulsometer pump and vertical steam boiler, mounted on wheels ready for transport to any desired place, the pump being detachable for use in confined situations. The "Deane" steam pump is also shown by the same firm, this being an improved horizontal pattern for boiler feeding and general work. The valve gear, being simple and positive in action, enables the speed of the pump to be regulated down to one stroke per minute. The exhibit also includes centrifugal pumps designed to swivel at any angle, and an air-lift pump, a device for raising large or small volumes of water by means of an air compressor at the top of the well, and a special foot-piece at the bottom. Messrs. Mather & Platt, of Salford, exhibit models of the "Archbutt-Deeley" water softener, of their patent gravity filter, and of the "Ridgway" sewage distributor for automatically dividing the flow of sewage equally over any number of bacterial or other beds.

The Patent Automatic Sewage Distributors, of Westminster, have a full-sized exhibit of automatic revolving and other sprinklers for bacterial beds, a rotating sewage feed, and an automatic sewage screen. Drawings are also exhibited illustrating sprinklers and valves for the Chester sewage works.

Mr. W. E. Farrer, of Birmingham, is another exhibitor of automatic distributing apparatus for small bacterial beds, such as are required for use in public institutions and other large buildings. The apparatus is simple in construction, and arranged in such a way as

to ensure adequate aeration of the liquid. The exhibit of Messrs. Ham Baker & Co., of Westminster, consists chiefly of penstocks, contractors' pumps, apparatus for drilling and tapping water mains under pressure, test pumps, apparatus for testing water mains, water meters of various types, and a varied selection of water valves, hydrants, and kindred fittings. Mr. George Kent, of Holborn, exhibits various sizes and types of water meters, amongst which may be mentioned the "Uniform" meter for trade and district supplies, and three forms of the "Venturi" meter for mains of any diameter. One form of the latter meter is combined with a recorder showing by a diagram the rate of flow at any moment, and by a counter the total quantity passed. A second form is fitted with a U-tube indicator, showing the rate of flow without the use of a recorder, and a third form has electrical counter and diagram transmitter, and receiving instruments, for conveying the record to any desired point. Messrs. Meldrum Bros., of London and Manchester, have on view models of regenerative refuse destructors, with Lancashire and Wilcox boilers. Refuse destructors of these types have been erected in many towns in Great Britain and the Colonies, and in almost every case the power is being fully utilised either for electric lighting, traction, or other purposes. Clinker flags, clinker bricks, and a model of Messrs. Fielding & Platt's hydraulic flag press are shown on the same stand. The adjacent exhibit of Messrs. Heenan & Froude, of Manchester, is devoted to the "Heenan" refuse destructor, centrifugal fans, forced-draught plant, smokeless chimneys, and coal-saving appliances. Disinfecting appliances are represented by a model of the "Equifex" saturated steam disinfector with automatic recording gauge, shown by Messrs. J. Defries & Sons, of London. The same firm exhibit portable spray disinfectors for hospital wards and rooms, the "Equifex" hot-spray disinfector for cleansing and disinfecting cattle markets, trucks, &c., Dr. Scurfield's ventilation indicator, and Pasteur-Chamberland filters. Messrs. James Keith & Blackman Co., of London, are exhibitors of Blackman electric fans, Keith's hot-water boiler and radiators in connexion with fans, illustrating a combined system of heating and ventilation. Messrs. Matthews & Yates, of Swinton, exhibit an ingenious refuse-collecting apparatus, with "Cyclone" dust separator; enclosed motor type electric air propellers for ventilating purposes, and various useful types of air propellers and blowers, some direct — driven by steam engine, electric motor, and others driven by belt. On the stand of Messrs. James Stott & Co., of London and Oldham, are to be found air propellers, water-driven fans, a new form of air-purifying screen for the "Plenum" system of ventilation, and the gas-pressure regulators associated with the name of this firm. Among lifting and hoisting machinery and appliances a working model of the Richmond-Carey electric lift, exhibited by Messrs. Richmond & Co., of London, is worthy of notice. This lift is very simple, requiring only one movable wire, and the services of an attendant can be dispensed with entirely. Messrs. Moffat & Eastwood, of London, exhibit self-sustaining belt-power elevators and lifts, and similar appliances, including their direct worm-geared hoisting machine for electric lifts (fig. 4). The Safety Lift and Elevator Co., of Deptford, exhibit a self-sustaining dinner lift of neat design. A serviceable labour-saving winch is shown by Mr. J. Fishburn, of High Wycombe. The machine is adaptable as a means of lifting or lowering articles or materials of almost every description with safety and despatch. For building operations in crowded thoroughfares, where the staging stands out to the curb, building materials can be hoisted direct from vans to required positions on the scaffolding, staging, or floor. Palmer's travelling cradle, to be found in another part of the Hall, consists of a light cradle raised or lowered by light and easily worked tackle, and the cradle can be moved along a wire rope to any part of the structure upon which it is intended to be employed, this operation being conducted by the men while in the cradle, and without any outside assistance. Representative examples of other contractors' plant and machinery are scattered in various parts of the exhibition. In the area Messrs. Wallach Bros., of London and Glasgow, exhibit lime and whitewashing machines in four sizes, capable of replacing eight, fifteen,

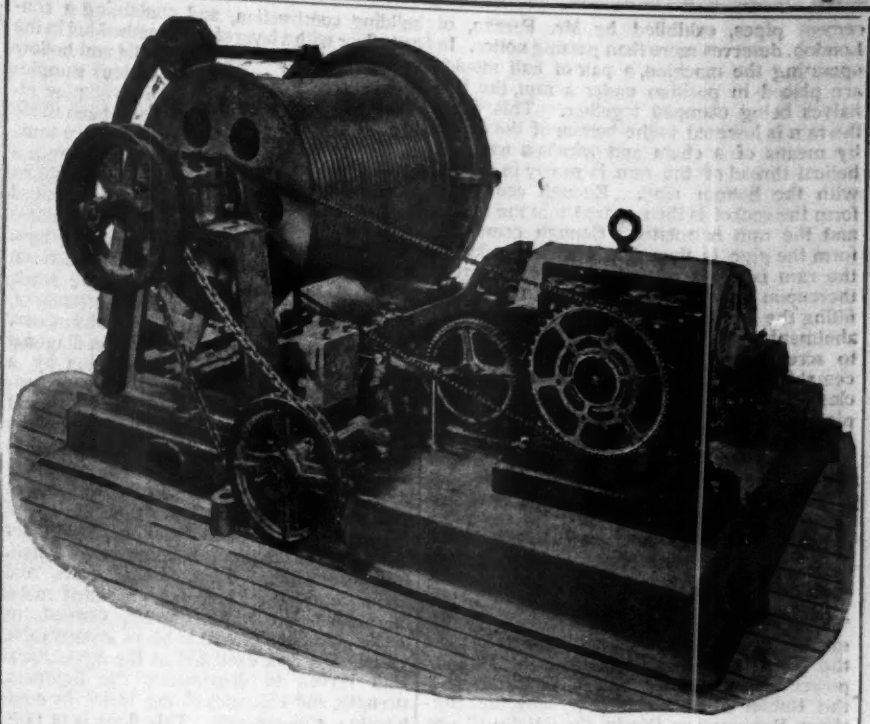

Fig. 4.

twenty, and twenty-five men respectively. Portable painting machines for oil paint are also shown, and it is claimed by the makers that as much as 100,000 super. ft. can be covered by one man and mate in a single day. In the gallery the Phœnix Engineering Co., of Chard, have some "1903" pattern horizontal and vertical pitch boilers, a serviceable hand-lift trench pump on barrow, and a lift and force pump on steel carriage. In the main hall, Mr. Bernard Asplen, of Southall, exhibits a new trench-cutter and scarifier, fitted with direct-acting springs and double fore carriage, so that no turning is necessary after each operation or cut. This machine will work backwards or forwards, and by the action of its springs it tips itself into the work at the predetermined depth. A lighter machine of the same class is on view at the same stand.

Messrs. Askham Bros. & Wilson show examples of material for railway and tramway construction, including automatic spring points, crossings, a portable crossover for temporary track, and sundry details of the same character. Messrs. Griffin & Co., of London, are also exhibitors of material for portable railways, and of tipping-waggons of various types. Messrs. Orenstein & Koppel, of London, have a comprehensive display of portable railway-track installations, portable switches, turntables, tipping-waggons, single and double deck brick cars, and Fawcett's concrete mixer. This apparatus, recommended as being entirely of English manufacture, has a mixing drum with two paddle arms and claws which revolve in opposite directions. All operations are under the control of one attendant, and forty charges an hour can be made. The machine may be used for concrete with broken stones or pebbles, and for cement or lime mortar mixing. The apparatus is made in various sizes, the largest being capable of turning out 32 cubic yds. of concrete an hour. Mr. A. Koppel is another exhibitor of concrete-mixing apparatus, made in Germany, and of general similarity to the mixer described above. The stone-cracker shown on this space appears to be a new departure in such machinery. The working jaw is divided vertically into several sections, worked consecutively by cams on the driving shaft. By this method of operation the strain on the machine is reduced in proportion to the number of jaw sections, thus rendering unnecessary the massive framework usually required. Mr. Koppel also exhibits various examples of portable-railway trackwork and plant, and in the minor hall a working model of an electric railway.

A new design mortar mill is to be found on the stand of the Glendon Engine Works, of Kettering. This machine is combined with engine and boiler, and although the mill is of the revolving-pan type, the customary "A" frames are entirely dispensed with. This feature of the design allows the attendant to feed the pan or to take the charge from it at any point. This exhibit includes also a brick breaker of strong but neat design, and a compactly arranged friction hoist with boiler and engine all mounted on strongly built steel truck.

We now come to the numerous exhibits of brick, tile, pipe, and other clayworking machinery, to do full justice to which would demand much more space than is available. Messrs. Herbert, Alexander, & Co., of Leeds, have on view different types of sand and clinker concrete brick machinery, and stiff-plastic brick machinery. An admirable semi-plastic brick machine of new type, capable of making 10,000 bricks per day, is exhibited by Messrs. Whittaker & Co., of Accrington, together with a very businesslike direct-acting steam press for copings, the whole being on a self-contained bed-plate, so that no special foundations are necessary. Mr. Caplen, of Croydon, has a small workshop in the Main Hall, containing one of his brick-moulding, shaping, rubbing, and cutting machines. From an inspection of this machine in operation we think it quite capable of effecting considerable savings both in material and time. The various implements formerly used for the same purpose, such as the bevel, template, square, bowsaw, and other specially prepared tools, are no longer required, and as the machine includes a circular saw, it is available for any ordinary sawing when not employed for shaping brick. The most noteworthy exhibit of the Nuneaton Engineering Co. is Stanley's multiple-die tile press, producing tiles with great accuracy and rapidity. The machine, which represents a new departure in tile making, is made in sizes with capacities varying from 2,000 to 5,000 tiles an hour. Mr. Joseph Hamblet, of West Bromwich, has on show a well-designed, direct-acting steam pump, suitable for liquids of any kind, as well as a selection of brick machinery.

In addition to plastic brickmaking, and sand-faced moulding-machines, and a double-side cutting-table, Messrs. Buchanan & Son, of Liverpool, exhibit a new brick die, which may be lubricated by either steam, water, or oil, and lubrication can be applied to the corners only, or to the corners and sides, or all over the stream of clay, according to requirement. Messrs. Mackies, of Reading, make a special feature of a self-oiling brick pressing-machine, with an output of 7,000 bricks daily, the press-box of the machine having an automatic oiling device, thus enabling the machine to be run all day without being stopped. Messrs. Pullan & Mann show an improved screw-pipe machine, producing earthenware pipes complete with sockets at one operation, and also capable of making bends, electric cable conduits, chimney linings, and other fittings; also one of Tilley's screw brick and tile presses, specially suited for the production of glazed bricks, high-class facing bricks, and ornamental tiles up to 18 in. square. The Kielberg machine for making

cement pipes, exhibited by Mr. Fernau, of London, deserves more than passing notice. In operating the machine, a pair of half moulds are placed in position under a ram, the two halves being clamped together. This done, the ram is lowered to the bottom of the mould by means of a chain and windlass until the helical thread of the ram is nearly in contact with the bottom ring. Enough cement to form the socket is then passed into the mould, and the ram is rotated. Enough cement to form the pipe is then run into the mould and the ram is again rotated. The screw thread thereupon forces down the charge, thoroughly filling the lower portion of the mould, and an abutment being thus formed, the ram begins to screw itself upward, further charges of cement being added until the thread has come clear of the top of the mould. The top of the pipe is finished by a few extra turns of the ram. Pipes made by this machine are very smooth internally, and being moulded under pressure the cement is very strong after hardening. Two attendants are required for the operation of the machine and its output is 100 pipes daily, each about 10 in. diameter by 3 ft. long.

Among other exhibitors of clayworking machinery the following may be mentioned:—Messrs. Sutcliffe, Speakman, & Co., of Leigh, "Emperor" brickmaking machine for the manufacture of lime-sand and concrete bricks; the Normanby Brick Co. exhibit the Hughes' power press; Mr. Hughes, of Charing Cross, the Buhler brick machinery; and the Horsham Engineering Works, the "Vulcan" pug mill.

Although machinery by no means preponderates in the Exhibition, it must be admitted that there is very little to be seen that is not of direct interest to builders and contractors, and of indirect interest to architects, and to engineers who are concerned in works were building materials and kindred products are employed.

ELECTRIC EXHIBITS.

We were surprised to find that, with the exception of an exhibit by the well-known Simplex Steel Conduit Co., there were no exhibits of systems of wiring for electric light. Electricity as applied to ventilation is represented by the well-known "Blackman" fans (fig. 5). An electric lift is exhibited with

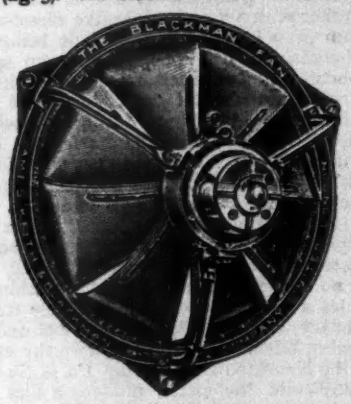

Fig. 5.

safety cut-out to prevent overhauling and suitable automatic starting-gear; also a very handy sack hoist to lift sacks at a speed of 400 ft. per minute. We were struck with the numerous examples of the electrical driving of the wood-working machinery. For working wood successfully high-speed tools are necessary, and hence small electric motors are particularly convenient.

FIREPROOF CONSTRUCTION.

Considering the extreme importance of fireproof, or more correctly fire-resisting, construction it is a little disappointing to find so little prominence has been given to this department of work in the International Building Trades Exhibition. It is true that in one way or another a good number of exhibits are to be found relating directly or indirectly to fireproofing, but there are not so many complete expositions of such construction as might reasonably be expected. Perhaps one of the most complete exhibits is that of the New Expanded Metal Co., of Westminster, who have two stands, a small one in the gallery devoted to steel cores for concrete conduits, and a larger space on the ground floor of the main hall occupied by a pavilion exemplifying the expanded-metal system of building construction, and containing a concrete floor with a layer of metal embedded in the under surface, and examples of solid and hollow partitions, ceiling work, and various samples of expanded metal itself. Like most new inventions, many improvements have been made in expanded metal since its appearance some years ago. Its development has been a process of gradual evolution, so that the material, as now manufactured, has not only been improved and reduced in cost, but its scope of usefulness has been largely extended in various directions. Expanded metal consists of slit and opened-out sheets of metal producing trellis-like work, with diamond-shaped meshes and strands of, practically, any desired sizes and thicknesses. The cutting and opening out of the diagonal strands are effected in one operation by a specially designed machine. This process results in a product of greater rigidity and covering area than that originally possessed by the sheet operated upon, without any waste of material. Beyond its uses as an efficient substitute for sundry forms of wirework, expanded metal has found a wide scope of useful application in general building, and more especially in fireproof building construction. In fire-resisting floors, roofs, walls, and partitions, the employment of expanded metal in combination with concrete, cement, or plaster, has been proved to be of considerable value. The floor exhibited at the Agricultural Hall serves to demonstrate the lightness, strength, and efficiency of the metal in combination with concrete. This floor is of 14-ft. span, and its strength is sufficiently illustrated by the fact that no joists are required for the purpose of intermediate support. The thickness of the concrete slab in which the metal is imbedded necessarily varies according to the span and the load to be carried. Where joists are placed wide apart or the loads to be carried are heavy, a sub-structure of concrete and steel channel arches may be employed to carry the flooring slabs. Practical tests have demonstrated the fact that the behaviour of expanded metal in concrete when under fire is entirely satisfactory. Owing to its open-mesh formation and the comparatively small proportion of metal, no harmful effects are to be feared by reason of expansion or contraction. As the result of tests made upon an expanded metal floor by the British Fire Prevention Committee two or three years ago, it was shown that the plaster ceiling remained intact until the application of water, and although slight deflection of floor and ceiling was noticed and the concrete was superficially cracked, the fire did not pass through the floor. As this particular test was conducted at a maximum temperature of 2,000 deg. Fahr., upon a floor measuring 100 superficial feet while carrying a load of 140 lbs. per sq. ft., it is tolerably clear that the combination offers a reasonable safeguard against fire. The solid partition exhibited by the company is 2 in. thick, the metal groundwork consisting of vertical rods, usually fastened at top and bottom to other parts of a structure, and the metal is wired to these supports. In some cases light angles, channels, or gas-tubing may be conveniently used in place of the tension rods. These solid partitions consist exclusively of metal and plaster, and are sometimes built 1½ in. thick, but more usually they are made to finish up to 2 in. thick. Such partitions possess all the required essentials of a division wall, and their value in arresting the growth of a fire has been amply demonstrated in the past. Their weight is not more than 18 lbs. per square ft. of surface area, and the combination of steel and plaster forms a monolithic slab capable of resisting considerable pressure. At New College, Oxford, similar partitions over 12 ft. in height have given very satisfactory results, and the rigidity and stability of this construction is further demonstrated by partitions 19 ft. high in the Medical College of the London Hospital. The hollow partitions exhibited on the same stand are formed of light angle-bar standards and metal lathing plastered on both sides. This form of construction is very suitable for the exterior walls of buildings or for giving a more substantial appearance to the doorways of interior walls. Fireproof ceilings, of which samples are exhibited, form another useful application of expanded metal. Very simple methods of construction are followed. Bars placed at short distances apart are secured to the joists by metal clamps; to these the expanded lathing is attached by means of metal clips or wire, and plaster is applied in the usual manner. The fire-resisting qualities of such ceilings have been amply proved by practical experience in buildings, as well as by experimental tests. Although no examples are to be seen at the exhibition of fireproofing for girders, columns, and ironwork, the fact deserves recognition that expanded metal can be most usefully applied for such purposes. Such protection is of most vital importance in every building where the main supports are of cast-iron or steel, and it is a little unfortunate that a firm undertaking the complete equipment of buildings from the standpoint of safety from fire, should have omitted to include specimens or protection for members of the kind indicated.

An adjacent pavilion in the main hall has been erected by the British Uralite Co. with the object of showing the general adaptability of the material introduced by this firm. Uralite is a new fire-resisting and non-conducting material for building and other work, and is composed of asbestos fibre cemented by a mineral glue. The patentees claim that it is the best fire-resisting agent known to science, and that by its aid partitions and doors constructed that will absolutely stop the spread of fire, without twisting and jambing under heat. Uralite is unaffected either by damp, gases, or acids, does not expand by heat nor contract with cold. Consequently it does not warp, crack or shrink, and when painted is waterproof, being seasoned by time and hardened by exposure. In appearance the material is not unlike thick card-board. It can be fixed to the ceiling or to wood joists over gas jets, and to protect walls in fixing stoves. Tests which have been made with the new material show that uralite is absolutely non-flammable. It is, therefore, extremely suitable for the construction of light buildings as well as for application in various classes of interior work. The stand of the exhibitors serves to illustrate the employment of uralite in building construction, and its contents consist of samples suitable for roofing, ceilings, and partitions, samples painted with various paints and coloured with distempers, and others veneered in different kinds of wood. Models of uralite roofs are also shown, as well as a fire-resisting deed safe and a fire-resisting despatch-box. It may, perhaps, be useful to mention that uralite armoured fire doors are now being manufactured by Messrs. Mather & Platt, of Salford, and it is claimed by the makers that an ordinary door, with only two thicknesses of uralite, will retard a fire for a sufficient time to permit the escape of all the inmates of a building, and that specially-made uralite armoured fire doors will not pass flames so long as the walls in which they are fitted remain intact. Messrs. Mark Fawcett & Co., of Westminster, exhibit a full-size example of the Fawcett fireproof floor (fig. 6), with specimens of the material of which it is constructed. The principle of the floor, which was introduced by Mr. Fawcett some fifteen years ago, provides for the complete insulation of the lower flange of rolled steel floor beams or joists by interposing between them and the terra-cotta protection spaces through which air may freely circulate. A fire may heat through the plastered ceiling and may even heat the terra-cotta to a white heat, but before it can reach the steel beam itself, it must heat through a layer of air, and the more intense the heat the more rapid must be the circulation. This floor is now a long way past the experimental stage, and its merits have been recognised by many leading architects in this country and abroad. Nothing could be more simple than its construction. It consists essentially of a series of terra-cotta tubular lintels which are placed diagonally between ordinary steel joists spaced 2 ft. apart. Each lintel provided with a sufficiently large mouth, or notch, at each end, so that practically any sized joist may be used, and the flat part, or shield, of the lintel is made to hang clear of the joist flange, thus allowing room for expansion and also for the circulation of air as mentioned above. The difficulty of placing the tubular lintels into position for ordinary work was ultimately overcome by adopting the diagonal method of fixing. All the load is carried by the joists, and the object of the tubular lintels is to protect the joist and to form a support for the concrete filling above and the ceiling below. On the occasion of our visit to the exhibition we saw a full-sized section of flooring, covering a span

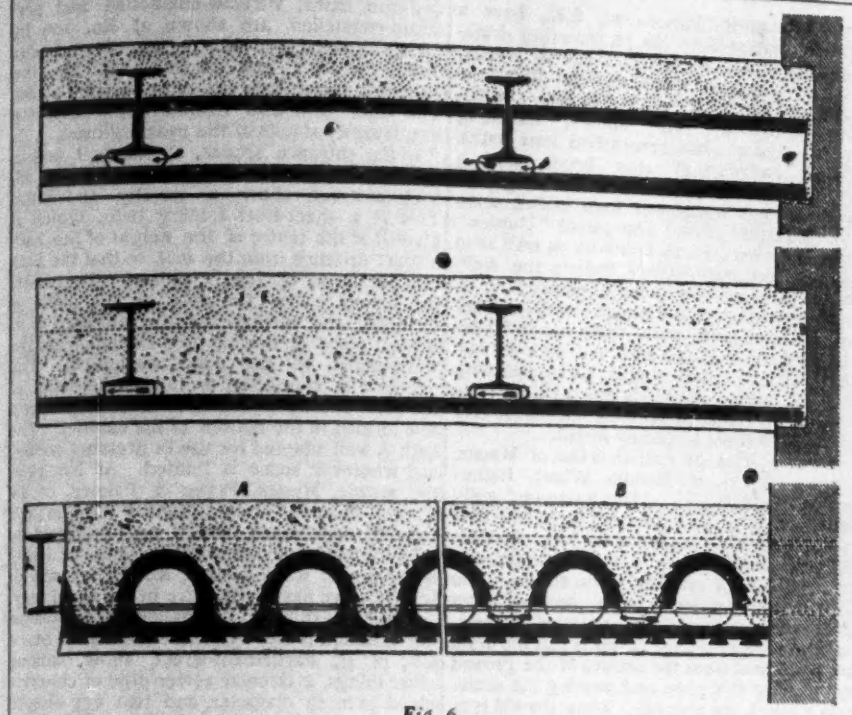

Fig. 6.

of some 16 ft., put into position without the slightest hurry in something less than one minute. One end lintel in each floor panel is cut suitably for making a parallel finish, and the pieces cut off are used for filling the angular spaces left at the opposite corners. The difficulty that would otherwise occur in filling in the last lintel of a given panel is got over by the play afforded by the notches. This makes it possible to lift up and slide three or four of the lintels one over the other to a sufficient extent to enable the last one to be put into place. The other units are then slid back into their original positions. Floors constructed upon this principle have been very largely used in many important buildings in this country and in America, some of the best known of such being the new Public Record Office in Chancery-lane, the new Admiralty Buildings, the National Portrait Gallery, and the eastern and western galleries of the South Kensington Museum.

Another exhibit of fireproof floor construction is that of the Columbian Fireproofing Co., of London and New York. This system consists of special ribbed steel bars, by the use of which ordinary steel joists are rendered unnecessary. These ribbed bars are in every case surrounded by, and completely embedded in, concrete, and by their special shape utilise the full strength of the concrete. The Columbian floor is made in three main forms (1) panelled floor for warehouses and stores; (2) double construction with level ceiling of concrete under and between the joists; (3) ribbed bar floor between the main girders, a level ceiling being formed between the main girders and walls. This union of concrete and steel forms a monolithic floor of considerable strength, which is more free from vibration than floors constructed in the ordinary manner with steel joists. The bars are protected in the manner adopted in the floor tested in 1899 by the British Fire Prevention Committee, when the heat attained reached 2,335 deg. Fahr.

Messrs. Potter & Co., of Westminster, exhibit a concrete fireproof floor 4½ in. thick, and 12 ft. between the supports, the floor being strengthened with ½ in. corrugated steel tension rods, spaced about three or four inches apart. Being corrugated the rods cannot shear or slide, and the effect is to counteract tensile strain upon the lower portion of the concrete, thus increasing the strength of the construction very considerably. Specimens of steel lath bracketing for plaster cornices, and of secret nailed wood to concrete floor are also exhibited on the same stand. Messrs. Powers, Deane, & Ransomes, of London, exhibit their "MP" fire and sound-proof floor and ceiling, a type of construction in which clear spans of 30 ft. can be attained without the assistance of main girders. The salient features of this floor are the following:—A hollow-tile floor lintel made from mild-tempered clay capable of sustaining temperatures up to 2,000 deg. Fahr. The lintels are 2 ft. in length by 6 in. wide, and are slotted through each end so as to bear upon the lower flanges of rolled steel joists spaced 2 ft. apart, thus affording adequate fire protection. Being of dovetailed shape, the lintels form a strong key for the concrete, and each bay of lintels, when filled in with concrete, forms a continuous flat arch, preventing any lateral thrust on the walls. The soffits of the lintels are grooved at the top and bottom so as to form a key for concrete or plaster, but the lintels are also made with glazed soffits for buildings where perfect sanitation is required. In connexion with the floor exhibited samples are shown of rolled steel joists, patent tiles, coke breeze concrete, and granolithic paving. The fireproof doors exhibited by this firm are composed of two stamped steel plates connected by pressed interlocking edges, and the space between the plates is filled with suitable fire-resisting material. This type of construction combines minimum weight with maximum stability, and, as the corners of all panels are bevelled and rounded in stamping, there are no acute angles likely to catch dust and dirt. This door is, therefore, specially adapted for use in hospitals and kindred institutions. The London Fireproof Platewall Company show internal partitions constructed of solid fireproof plates or slabs of gypsum, grouted together to form one solid piece on the Bruckner system. These partitions are finished perfectly smooth, so that no final coat of plaster is required, and they may be papered or distempered shortly after erection. Rough slabs are also made suitable for tiling. For the purpose of giving additional stability to walls or partitions, iron rods or tubes are cemented into vertical passages extending through the whole height of the wall at such distances as may be considered necessary. These vertical tubes, built up in sections, are fixed between and into the floor and ceiling joists, or between concrete floors, or steel joists, and after fixing are tightened up by means of right and left handed screwed sockets. The employment of stays in this manner makes it practicable to build walls of several hundred feet area without other intermediate supports. As instancing the size of walls that may be erected, it may be mentioned that in the new Midland Hotel, Manchester, the wall dividing the stage in the Concert Hall is 72 ft. long by 26 ft. 6 in. high. A further use for the Bruckner fireproof partition was found in the Concert Hall for casing stanchions, 38 ft. high, and also in the formation of air shafts and flues in connexion with the system of ventilation. As an instance of the speed with which the slabs can be erected, it may be stated that more than 8,000 superficial yards of walls were erected at the Midland Hotel in one month.

Messrs. J. A. King & Co., of Hayes, Middlesex, show a selection of Mack's patent fireproof slabs and blocks, made of gypsum, having embedded hollow reeds somewhat resembling bamboo in nature. The reeds form sealed air chambers, and with the plaster give a light, non-conducting material of great strength. The air-cells formed by the reeds tend to break up sound vibrations, and the non-conducting qualities of the slabs are proved by the British Fire Prevention tests, in which 2¾-in. slab partitions successfully withstood a temperature of over 2,250. deg. Fahr. the heat registered on the other side reaching little more than 100 deg. The slabs exhibited at the Agricultural Hall are 2 in., 2½ in., and 4 in. thick. They are readily fixed, and are applicable to various purposes in connexion with building construction; one of their most useful applications being to render existing buildings fireproof. Another type of fire-resisting partition is shown by the Acton Concrete Partition Company, this form of construction consisting of concrete slabs, 2½ in. thick, cast in such a manner as to facilitate rapid erection, and to afford a good key for tiling. Messrs. F. Jones & Co., of Kentish Town, exhibit a collection of silicate cotton productions in various forms for sound and fireproof construction. The "Hercules" (fig. 7) partition blocks of the same material

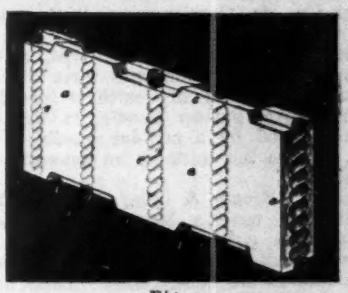

Fig. 7.

are made with projecting parts at top and bottom for holding the blocks in position, and with helical vertical channels, down which grout is poured to convert the whole of a series into one solid partition. Silicate cotton slabs in various sizes are also made, suitable for nailing up in any required position, after which they may be floated over and rendered with plaster. Wire-netted silicate cotton, or slag wool, is exhibited by Messrs. McNeill & Co., of London, for application in the fireproofing of structures, and the same material, in various forms, is also to be seen on the stand of Messrs. D. Anderson & Son, of London, Manchester, and Glasgow. The Asbestos and Asbestic Co., of London, have on view samples of asbestic fireproof plaster; and Messrs. Wallach Bros., of London and Glasgow, exhibit asbestos fire and water proof slabs for building purposes. The latter firm makes a feature of armoured glass, a material that ought to be very much more used by architects and builders than it is at present. The process of armouring renders the glass unbreakable, in the ordinary acceptation of the word, so that it cannot fly off or fall to pieces if exposed to blows or sudden shock, although it may be cracked. The value of this comparatively new combination is very great in fire-resisting building construction. Incombustible wood and fabrics are exemplified by the exhibits of the Non-Flammable Wood Co. and the Fire Prevention Building Co., both of London, while fireproof conduits for electric wiring are shown by the Simplex Steel Conduit Co., of Birmingham.

SANITARY EXHIBITS.

At the first glance, the show of sanitary ware does not appear to be either large or truly representative, but the exhibits are scattered about the area and gallery of the building, and are really more numerous and important than the casual visitor would think. It is true that many well-known firms are not represented; on the other hand, some firms whose manufactures are not often seen at exhibitions make a good show. In reviewing the exhibits we shall adopt the order in which they appear in the catalogue, beginning with those in the area of the hall.

At Stand No. 12 Mr. H. Hart, 29, Settles-street, E., shows a number of drain-clearing tools. Messrs. J. Bonsor & Co., 536, Barrington-road, Brixton, exhibit at No. 32 their lead sockets, strengthened with tinned copper, for lead soilpipes and wastepipes, and also some

Fig. 8.

very thin and flexible metallic cones for connecting flushpipes to water-closet basins; these are designed to take the place of the usual rubber cones, and are fixed with wire in the same manner. Moule's Patent Earth Closet Co., 5A, Garrick-street, W.C., exhibit their well-known earth-closets at No. 47A; the newest kind is of the pedestal type, without enclosure, and is made with three different actions—in one the dry earth is spread by means of a pull-up handle in the seat, in the second by a pull-out handle in the back, and in the third by an automatic seat action.

Messrs. Broad & Co., South Wharf, Paddington, have a large and interesting exhibit (No. 52) of drainage fittings, &c., among which white enamelled channel bends for manholes are conspicuous. Their urinal channels with large brass gratings (each fixed with a single screw) are also worthy of mention. A modification of the well-known Dean's grease-trap has a reversible dished top with junctions for two surface channels. There is also an "improved accessible gully," having a sweeping eye fitted with a galvanised-iron cover. Other forms of trap are shown, and a number of cast-iron drainage fittings, including junctions and inspection-chambers. Broad's patent sink is also worthy of mention; the waste outlet is at the bottom of a small well in the middle of the sink, and is fitted with a grating in the usual way; above the grating a perforated cup-shaped strainer of tinned copper is placed, so that when the strainer is in position all liquids draining from the sink must pass through it, the large solids being retained.

"The Darwen Sanitary Pipes," of Darwen, exhibit at No. 68 salt-glazed drainpipes, 24 in., 30 in., and 36 in. in diameter and 3 ft. long, and an 18-in. street gully, 4 ft. deep, of similar ware, all of which appear to be very strong and durable. A much more varied display is made at the next stand by Messrs. Thomas Wragg & Sons, of Swadlincote. Stoneware drainpipes of good quality are shown, with special joints of various kinds, including the well-known Stanford, Hassall's single and double lined, and Wakefield's. The last has a corrugated band in the lower part of the socket, the spigot of the next pipe resting on the summits of the corrugations; true alignment is thus secured; the joint is now adopted for pipes up to 30 in. in diameter. A more recent invention is the "spiralitic" joint; the composition rings in the socket and on the spigot are arranged in spiral form, and when the pipes are put together a spiral groove is formed which is then run full with liquid cement. Wakefield's patent stoneware street gully is also shown; this has three chambers and a double trap, and is made in sizes up to 21 in. by 18 in. by 4 ft. deep. Jennings's patent "joinder or impermeable capped stopper" is a very simple and useful invention for stopping the junctions in new sewers; a stoneware cap is burnt on to the socket of the junction, a groove being sunk around it, so that the cap can be easily cut off with a chisel when a connexion is to be made with the sewer; as the cap is really a part of the pipe, there is no possibility of leakage. Emden's patent stopper for inspection-arms has a composition joint in the form of a screw. Among the other exhibits are manhole-channels, junctions, and benchings in salt-glazed and white enamelled ware, intercepting traps, junction blocks for brick sewers, and sinks. Messrs. George Jennings, 63-67, Lambeth Palace-road, S.E., have a large display at Stand No. 71, including drainpipes, channels, traps, &c., made by Messrs. Thos. Wragg & Sons at their Parkstone pottery and brick works, Dorset. Sanitary fittings are also shown, including fireclay and porcelain-enamelled iron baths, copper baths with zinc hoods, and a nickel-plated skeleton bath. Among the lavatories are tip-up and fixed basins, some having marble slabs. The patent "Duplex" valve is shown fitted to lavatories as well as to baths. The water-closets include the well-known siphonic "Closet of the Century" (fig. 8), wash-down closets, and trough closets. There are also three good urinal stalls, one in white-glazed ware with the base and back in one piece, and two with similar backs and with slate and marble surrounds and divisions; the treads have V-shaped portions cut out so that the floors will not be unduly fouled.

Another drainage exhibit is that of Messrs. Dawson & Co., of Mendip Wharf, Battersea, at Stand No. 74. Their "Mendip" gully has a perforated bucket, raising piece with side inlets, and a large grating at the top. A stable gully on similar lines, but with larger and stronger hinged grating, is also shown. The "Glasarm" interceptor has a piece of sheet glass bedded in cement in the socket of the clearing arm; the advantage of this is that the drain can be cleared from the surface of the ground by breaking the glass and passing the drain-rods through the opening; when the old type of stopper is used, there is a difficulty in clearing the drain when the manhole is filled with sewage. We also noticed an improved rainwater and waste-pipe shoe, the parts being reversible and the inlets being close to the wall. There is also a varied assortment of manhole-channels, gully-traps, interceptors, pipes, sinks, &c., many of them made in a smooth, highly-glazed brown ware to which the name "Ephos" has been given. At No. 82, Messrs. Stanley Bros., Ltd., of Nuneaton, show some sinks of ordinary type and a few drainpipes; a salt-glazed channel for wastepipes has the rim splayed down to a channel which is about three-fourths of a circle in section, and splashing is therefore prevented.

Messrs. John Knowles & Co., of 38, King's-road, N.W., show a number of drain pipes and accessories at No. 83 in the area of the hall and No. 38 in the gallery. Their patent "B.P." stoppers with Stanford joints for clearing arms, &c., are simple and ingenious; the socket of the clearing-arm has two segments burnt on, leaving an oblong opening with rounded ends; the stopper is of the same shape, and after being placed in position it is wedged tight by a quarter-turn. Bellman's gullies with galvanised wire grids, and other kinds of gully are also shown. The "Anti-Vap" street gully is of stoneware and has a cylindrical body 18 in. in diameter, and a trap outside. The "Aquarius" water-closet may also be mentioned, the peculiarity being the half-trap which allows the outlet to be turned in any direction. Messrs. Shanks & Co., Ltd., of 81, New Bond-street, W., have also two exhibits—at Stands 1 and 84—which, taken together, form the best collection of sanitary fittings in the exhibition. There are baths in fireclay and porcelain-enamelled iron, some of them fitted with the siphonic overflow, which is also applied to lavatories. The lavatories are of various kinds, including constant-stream basins for schools, treadle-action lavatories, and others of more usual type. Water-closets, both siphonic and wash-down, are shown, and particular mention may be made of the "jet" cistern, in which siphonic action is started by pulling a lever, by which a jet of water is forced into the leg of the siphon, the action being almost noiseless. Among the other exhibits are washing-up sinks, slop sinks, tubular or skeleton baths, a sitz bath, and a neat weighing machine for use in bathrooms.

Stoneware drainpipes and fittings may be seen at No. 88, exhibited by the Staunton Colliery and Sanitary Pipe Co., of Worthington, near Ashby-de-la-Zouch. Mention may also be made of what appears to be a tinned copper double sink, shown by Messrs. Beaven & Sons, of 27, Victoria-street, S.W., at No. 92; this has a metal framework and two perforated strainers across the angles, with copper standing wastes and overflows in the spaces thus formed. Messrs. Candy & Co. of Newton Abbot, show some excellent stoneware drainpipes, gullies, &c., at "Special Position No. 4," near Stands 94 and 95. Some cast-iron baths, vitreous-enamelled and porcelain-enamelled, are shown at No. 126 by Messrs. Yates, Haywood, & Co., of 95, Upper Thames-street; and at No. 155 by the Ashton & Green Iron Co., of 11-14, Bury-street. The latter firm also exhibit some cast-iron iron lavatory-stands of the usual ugliness.

In the entrance arcade, at Stands 1 and 2, the Elliray Patent Bath Syndicate, of 28, Victoria-street, show a novelty in baths. This is a sheet-steel folding bath, which is pivoted at the centre of the height of the bath a short distance from the foot, so that the bath can be tipped up into a cabinet. To render the action easier the foot of the bath is weighted, and springs are also attached to it. A short piece of flexible tube extends from the waste-outlet to the fixed wastepipe. The overflow is connected to the waste-outlet of the bath, or may be made to discharge over a safe formed in the bottom of the cabinet. The bath is well adapted for use in dressing-rooms, and wherever space is limited. At No. 23 in the arcade, Messrs. Pryke & Palmer, of 48, Upper Thames-street, exhibit Fullerton's metallic connexions, which are designed to take the place of indiarubber cones for fixing flushpipes to water-closets, &c. They are of lead, and are fixed with wire in the usual way.

The first exhibit in the gallery which claims our attention is No. 25, where the Basalt Stone Co., of 45, Parliament-street, show, among other things, a circular sewer-pipe of concrete about 40 in. in diameter, and two egg-shaped pipes about 4 ft. and 5 ft. high, one of which has an egg-shaped oblique junction cemented in. They are not fortified with steel in any way, and have every appearance of strength and durability. At No. 32 Messrs. John Ellis & Sons, of Leicester and London, show a large circular concrete manhole, and a number of concrete sewer-pipes, which are described as "silicated steel-ribbed tubes," and are true and strong.

At No. 2 in "The Surveyor" Section in the gallery, the Patent Automatic Sewage Distributors, of 4, Westminster Palace-gardens, exhibit apparatus of various kinds for the bacterial beds required in sewage purification, including a mercury-sealed automatic revolving sprinkler to be used at the Chester Sewage Works, a model of a sprinkler in operation, automatic feed valves, &c. At the next stand Messrs. Ham Baker & Co., of 13, Grosvenor-road, have a large exhibit of fittings for waterworks, and also of sewerage fittings, including penstocks of various kinds (some having gun-metal faces), manhole covers, automatic flushing siphons, &c. There is also a sewer-ventilating shaft having a large rust chamber at the base, with a clearing arm brought up to the surface of the ground. Mr. Vernon Parker, of 20, Victoria-street, has a varied exhibit at No. 4; among those of particular interest in the sanitary section are specimens of the blue "ironware" pipes and invert blocks made by Hamblet's Blue Brick Co.

The Albion Clay Co., of Woodville, Burton-on-Trent, have a large display of their well-known stoneware drainpipes and fittings at No. 6. The "new pattern" Sykes's patent street gully has the clearing arm inside the gully, and the trap is ingeniously contrived so that it does not obstruct the passage of the drain-rods; it has a deep seal and is made with either a deep or shallow outlet. Sykes's new patent drainpipes, interceptors, screw-stopper, rainwater shoes, and other fittings are also shown, together with the "Accomo" adaptable gully, which has a raising piece with a number of side inlets, and a loose top; it is useful for connecting a number of branch drains to one trap, and forms a small inspection-chamber.

At No. 11 Messrs. Freeman & Hines, of Westminster Palace Hotel, show a new drainpipe joint known as Freeman's double-seal pipe joint. It has composition rings on the spigot and in the socket, but these rings increase in thickness as they make the circuit of the pipe; the end view is therefore part of a spiral. The spigot can only be placed in the socket when the thick part of the ring on the spigot is opposite the thin part of that in the socket; a slight turn of the spigot pipe wedges the rings together, and the joint is then finished with cement. The pipes are easily fixed, and will probably be largely used. An independent cast aluminium bath with roll edge is also shown by the same firm, and is decidedly an interesting novelty; it is 5 ft. 6 in. long inside and 6 ft. 2 in. outside, and the greater part of it is brightly polished. The cost is more

than that of a porcelain-enamelled iron bath of the same size, but not so much more as we should have expected, and as aluminium is a very durable metal, many persons will prefer it before iron.

The Ames-Crosta Sanitary Engineering Co., of South-parade, Nottingham, at No. 12, show their self-adjusting double-seal drainpipe joint, which has a collar near the spigot end, forming with the socket an annular chamber which can be run with cement. Crosta's patent surface-water gullies are also shown.

Messrs. J. Defries & Sons, of 146, Houndsditch, exhibit their well-known "Equifex" and other disinfecting appliances, the "Odourless" tank-waggon for emptying cesspools and gullies, and different types of Pasteur (Chamberland) filters. At the next stand (No. 15) Liernur's English Syndicate, of 110, Cannon-street, show drawings, photographs, and models of their pneumatic system of sewerage; the only place in England where the system is in operation appears to be the village of Stansted, in Essex, and the pamphlet describing this installation is well worth reading. Messrs. G. M. Callender & Co., of 25, Victoria-street, show Lowe's patent "Rubite" drainpipe joint. The pipes are of stoneware without sockets, and are jointed by means of a bituminous composition, which is run into a removable iron mould, and forms a strong collar around the joint. Ten pipes may be joined together before being lowered into the trench, and the connecting joint is then made *in situ*.

At No. 17 Mr. W. E. Farrer, of 36, Cannon-street, Birmingham, shows an ingenious automatic alternating apparatus for distributing the effluent from sewage-tanks over two bacteria-beds alternately; it consists of a "tipper" extending over the division between the two beds and resting on gun-metal bearings at the ends; the tipper is divided into two compartments by a longitudinal diaphragm, each compartment having a small hopper to receive the sewage. The sewage enters the first hopper and is stored in the first compartment until the weight of the sewage overbalances the tipper and the sewage is discharged over the first bed. The partial revolution of the tipper brings the second hopper under the sewage-inlet, and the sewage entering this hopper is ultimately discharged over the second bed. The sewage is discharged from the tipper through special winged orifices into perforated iron troughs laid over the filtering material, and equal distribution is thus effected without disturbance of the surface. Mr. Farrer also shows his "Torfit" urinals, which are constructed of a special material and brushed over every week with a particular preparation; it is claimed that flushing with water is not required, and we understand that one of these urinals is now being practically tested at the underground conveniences at Oxford-circus. Among the other exhibits at this stand are flushing siphons, penstocks, a sewer-ventilating column with a rust chamber placed in a good position at the base, and other examples of sewerage ironwork. At No. 19 Messrs. Mather & Platt, of Salford, show a model of the "Ridgway" patent sewage-distributor and large valves of various kinds. The Webb Lamp Co., of 11, Poultry, exhibit (Nos. 7 and 8) their "sewer-gas extractor and destructor lamps" in operation, and at Nos. 16 and 17 Messrs. Sutton & Co., of Overseal, near Ashby-de-la-Zouch have a good show of smooth and true drainpipes and fittings, among which we may mention Smith's patent iron-jointed stoneware pipes; these are about 4 ft. long, and have iron sockets with iron rings on the spigots, so that a caulked joint can be made. Sutton's drainpipe joints, and Green's "Wyvurst" manhole channels, are also shown, and a number of gullies, traps, access-pipes, &c. At No. 10 we noticed a diagram of a sewage-purification system designed by Mr. Alfred S. Goodridge. We believe that a model is also exhibited, but it was covered at the time of our visit.

Mr. Goodridge puts his aërobic filter before the anaërobic. At the next stand Messrs. Cakebread, Robey, & Co., of 86, High-street, Stoke Newington, N., show a large number of drain-clearing rods, fitted with the "Ferrett" patent lockfast brass joints, which are certainly an improvement on the ordinary screwed joints.

The New Expanded Metal Co., Ltd., of York-mansion, Westminster, show (at No. 19) th

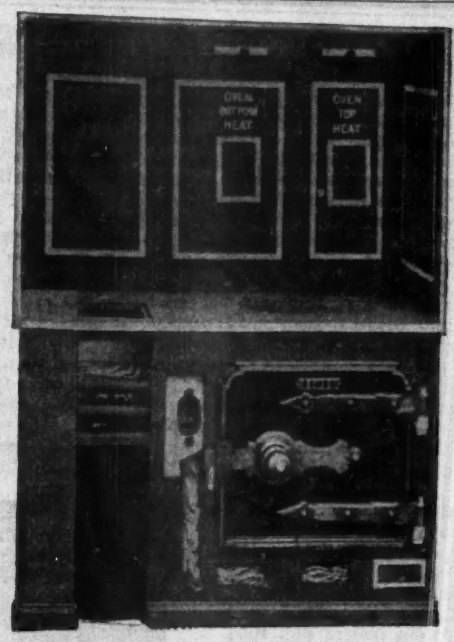

Fig 9. [*See next page.*

expanded steel core used for a concrete conduit 6 ft. in diameter, and at Nos. 24 and 25 the Imperial Stone Co., Ltd., of East Greenwich, S.E., show some good "silicated stone" pipes 4 ft. in diameter. Passing mention may be made of the "Bexley" cesspool-emptying van and the vacuum gully-emptier exhibited by Messrs. George Waller & Son, of 165, Queen Victoria-street, E.C., at Nos. 33 and 34. The next stand contains a large variety of cast-iron fittings for drain-pipes and soil-pipes, drain-plugs and bag-stoppers, smoke machines, &c., exhibited by Messrs. Burn Bros., of 23 and 24, Charing-cross, S.W., among which may be mentioned the soilpipe junctions fitted with small access covers.

FIRE-GRATES AND STOVES.

There are comparatively few exhibits of grates and stoves. The first mentioned in the catalogue is at Stand No. 126, where Messrs. Yates, Haywood, & Co., of 95, Upper Thames-street, E.C., display a large assortment of their manufactures. The principal novelty in grates is the "Recessed" fire, which is one of the many modern grates without front bars; the grating on which the fire rests is raised above the hearth, and is masked in front by an iron moulding, under which is a close fret or economiser. The top of the moulding is about 7 in. above the hearth, and the large amount of iron is somewhat objectionable. Other grates of more ordinary type are shown, and a number of cast-iron mantels and mantel-registers of much better design than is usually seen in this class of work. The "Quadrant" kitchener is shown in operation; it receives its name from the quadrants by which the lifting and lowering of the fire are effected. The mechanism of the lifting fire, which is self-adjusting and can be operated with one hand, is very simple, and this is an important point. The flues are of cast iron, which, of course, add to the cost of the range, but have the advantage of rendering faulty setting almost impossible. A large independent "table" range, measuring 10 ft. 4 in. by 4 ft. 4 in., is a conspicuous object; it has two large ovens on each side with a fire between each pair, and a gas oven at one end. The products of combustion from the coal fires pass over the ovens, down the sides furthest from the fires, and back under the ovens to descending flues connected with main flues under the floor. We also noticed a well-finished grill with a hot closet over it.

Messrs. Smith & Wellstood, Ltd., of 7, Upper Thames-street, E.C., show a number of register grates with front bars of the usual type and firelump bodies; the bright iron interiors in the Adam style are a special feature, and are a welcome change from tiles and briquettes. The "Sovereign" kitchener is a well-finished range with lifting fire and open or closed fire, and is designed for setting with brick flues. The "Bonnybridge" independent range or stove is a cooking-range of different type, made in sizes from 36 to 48 in.

At the next stand (No. 132) Messrs. Bratt, Colbran, & Co., of 10, Mortimer-street, W., show their "Heaped" and "Valley" fires in a variety of forms. The former has a flat grating raised about 3 in. above the hearth, the space between the two being closed in front by a movable fret or economiser; the grating is loose, and can be taken out at any time when the fire is not burning. The "body" is of fireclay with splayed cheeks, and the upper part of the back slopes well forward over the fire. The grate is shown in action, and gives out a great amount of heat with slow combustion of the fuel. The "Valley" fire shows more ironwork in front, the grating being made to slope downwards from the front to the middle of the fire-space, where it meets a fireclay base which slopes up to the fireclay back. The space for the fire has therefore a V-shaped bottom, the front slope being formed by the grating, and the back slope by the fireclay base. This is a slow-combustion fire, which does not differ in appearance from the ordinary type of grate to such a degree as the "Heaped" fire. We are pleased to note that these fires are fitted to inexpensive cast-iron mantel registers, as well as to more costly wood mantelpieces of good design.

Messrs. Clark, Hunt, & Co., of Shoreditch, E.C., have two exhibits—Nos. 11 and 142. Among their domestic grates we noticed the "Peveril," in which the front part of the bottom is a sloping firelump and the back part a level grating; an ashpan (closely fitting in front) slides under the grating, and there are no front bars. The "Florence" grate was specially designed to consume an appreciable portion of the smoke. The firelump back has a horizontal slit slightly below the level of the top bar of the fire basket; this slit is opened or closed by the movement of the canopy over the fire. When the fire has "burnt up" brightly, the canopy should be nearly closed and the smoke then passes through the opened slit at the back of the fire. The "Derwent" is still another form of grate. The "Middlesex" double-oven Kitchener has a simple lifting fire, and a sliding door in front of the fire. The independent "Caterer" restaurant range is shown in operation, and is an ingenious invention. The range is fitted with a low-pressure *steam* boiler, from which steam is taken through a coil in a cylinder for the purpose of providing hot water, and another steam-pipe is taken to steam-ovens. Bailey's patent geyser boiler range for small flats, &c., contains a boiler fed directly from the service-pipe by opening a stopcock; a return-pipe is taken to the sink, or other fitting where hot water is required, and is left with an open end. When the apparatus is full of water, the stopcock is closed and the open return serves as an expansion-pipe. To draw hot water, the stop-tap (which is fixed immediately over the open end of the return-pipe) is opened, and the pressure of the cold water entering the boiler forces hot water out of the return-pipe. The system has some obvious disadvantages, but is economical, and will no doubt prove useful.

At No. 155, the Ashton & Green Iron Co., of

11 to 14, Bury-street, E.C., show their "Sine Quâ Non" kitchen ranges, with a lifting-fire arrangement which is so designed that the grating remains level at all heights; in many kitcheners the lifting is more apparent than real, as the back part of the grating remains stationary. There is a telescopic hood over the fire, and the fire can be open or closed. The "Sunk" fire is another grate without front bars; the grating on which the fire rests is level with the hearth, and air is conveyed to the space below it through small ducts under the hearth; the chief peculiarity is the perforated fireclay curb in front of the fire, but whether this possesses any advantages or not can only be ascertained by actual test. The "Semi-well" fire has the bottom grating in two parts, the front part sloping downwards and the back being level; there is an iron moulding in front of the gratings, with an economiser below it. We also noticed some cast-iron mantel-registers well designed and finished.

Messrs. James B. Petter & Sons, Ltd., of Yeovil and 73A, Queen Victoria-street, E.C., exhibit various forms of their well-known "Nautilus" grate at Stand No. 4, and at the next stand Mr. T. Potterton, of Cavendish Works, Balham, S.W., exhibits kitcheners (fig. 9) fitted with his patent boilers (fig. 10), which are designed with very large heating surfaces, so that the water can be heated to a high temperature in a very short time.

At Stand No. 3 in the Entrance Arcade, the Coalbrookdale Co., Ltd., of 141, Queen Victoria-street, E.C., exhibit the "Bostel" patent com-

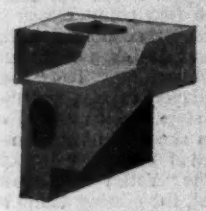

Fig. 10.

bined sunk and lifting fire (fig. 11). The fuel is contained in an iron basket, the section of which (from front to back) is a segment of a circle;

Fig. 11.

to the back edge of the basket a firelump back is fixed. The basket is hung in such a manner that it can be turned up or down, and the back moves with it; on lighting the fire the basket would be turned up and the back would then be nearly vertical; later the basket may be turned down (giving the appearance of a sunk or well fire), and the back then assumes the sloping position which is common to all good modern fire-backs. The grate is shown in action, and certainly seems to be very successful. Fig. 12 shows one of the mantels with hooded grate opening by the same exhibitors.

GAS APPLIANCES.

A more favourable opportunity than that afforded by this exhibition for bringing to the notice of architects and builders the many useful gas-consuming inventions of recent years cannot be conceived, yet few of the makers of gas appliances have availed themselves of it. Gas water-heaters and gas engines, it is true, are satisfactorily represented by the exhibits of a few well-known manufacturers, and one firm has a very fine exhibit of high-pressure gas lighting; but none of the leading makers of the gas-heated industrial appliances used in connexion with the building trades are represented, nor are the principal manufacturers of gas cookers, fires, and stoves among the exhibitors.

Although, however, the gas exhibits are not numerous, the few that are to be seen are well worth inspection. The following are the principal exhibitors of gas appliances:—

The James Keith & Blackman Co. exhibit a number of their high power incandescent gas lamps. By means of a Keith compressor the pressure of the gas as it flows towards the burner is raised to the equivalent of an 8-in. column of water, so that the power possessed by the jet of gas passing through the burner nozzle of drawing in air through the air-holes in the mixing tube is increased, and the mixture of gas and air which reaches the point of ignition contains a larger proportion of air than when the gas flows to the burner under a lower pressure. The result of using the gas under this higher pressure is to increase its lighting efficiency. With a burner consuming

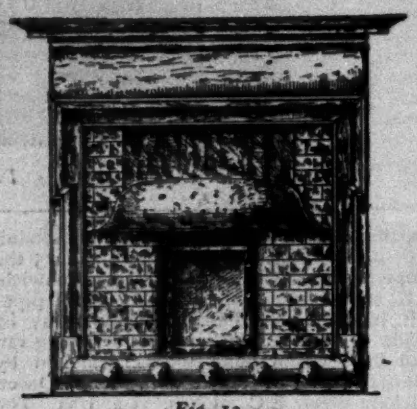

Fig. 12.

gas at the rate of 10 cubic feet per hour light of 300 candle power is obtained. The source of power employed to operate the compressor may be the ordinary water service, or a small dynamo or gas engine; or the compressor may be driven from machinery shafting.

Messrs. S. P. Catterson & Sons, of Newington-causeway, exhibit a large variety of gas-pendants, brackets, and shades, and a number of incandescent gas-burners. A specimen of the inverted incandescent gas-lamp, which is shown in action by this firm, should be inspected by those who have not yet seen this novel form of gas-light.

Messrs. Ewart & Son, of Euston-road, have on view a number of their well-known gas geysers (fig. 13). These are made in different sizes. Generally speaking, the prices rise as the quantity of water heated in a given time increases. A geyser which heats to a given

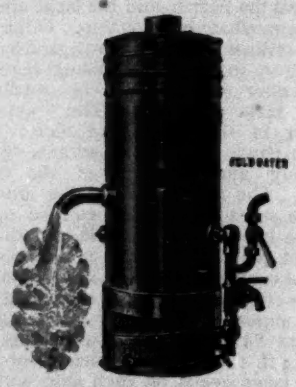

Fig. 13.

temperature only one gallon per minute is less costly than one which heats eight gallons per minute to the same temperature. A special locking gear may be attached to the geyser, so that the gas flames cannot be turned up until the water tap has been turned on. It is thus impossible to first heat the geyser to a red heat and then pass cold water into it. We are glad to note that these manufacturers state in their catalogues that "geysers must *never* be fixed without a vent-pipe communicating with chimney or outside of bathroom." If this provision of a vent-pipe be made, and the additional precaution of seeing that there is a constant updraught in the vent-pipe even when the gas is not burning be taken, these geysers may be used with great advantage.

Maughan's Patent Geyser Co. also exhibit several gas geysers, and likewise point out that a vent pipe to convey the products of gas combustion from the bathroom is a necessity. Some idea of the extent to which these geysers are used may be gained from the statement that this firm alone has sold over 15,000.

Messrs. P. Fenlon & Sons, of Tudor-street, include some "Tudor" Geysers among their exhibits, and also show in action some very effective Hot-water or Steam Radiators of simple construction, in which gas is the fuel employed.

Messrs. Pryke & Palmer, of Upper Thames-street, exhibit some specimens of the "Exeter Gasteam Radiator," which also utilises gas as a fuel. The facility with which the temperature can be regulated by simple adjustment of the gas cock certainly renders gas an ideal fuel for water heating.

Messrs. Beaven & Sons, of Victoria-street, exhibit a novelty in the form of a combined Gas Cooker and Hot-water Circulating Boiler. It is claimed that hot water can be conveniently and economically distributed throughout a building by means of this device.

Crossley Bros. exhibit some of their gas-engines. The engines manufactured by this firm are too well-known to need description here.

The exhibits of the Forward Engineering Co. and of the National Gas-engine Co. have been mentioned under the heading "Machinery."

Messrs. James Stott & Co. have on view some of their gas-pressure regulators for effecting economy in the consumption of gas, but their stand is largely occupied with exhibits in no way connected with the use of gas.

The Webb Lamp Co. have a unique exhibit. A number of street incandescent gas-lamps are shown, supported on metal columns in the usual manner; but the columns are so constructed as to also serve as sewer-gas extractors, and above the incandescent mantles jets of flame project which serve to draw up the sewer gas and to render it innocuous.

MISCELLANEOUS.

The exhibits which, though worth notice, cannot be classed under any of the preceding heads, we will take in the order in which they occur in the catalogue.

The Offa ventilator (fig. 14) is an inlet ventilator containing an air-filter; its special character consists in the metal plate placed over it on the

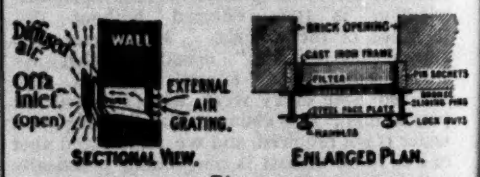

Fig. 14.

inside wall, which can be drawn away from the opening, working on parallel pins in each corner, so that it forms a shield from the direct draughts, and directs the current sideways in each direction so as to spread it over the room. When pushed close back to the wall again, it forms a cover which stops the entry of the current, if that is desired.

Messrs. C. Chancellor & Co. exhibit, among other things, a movable chimney cowl (fig. 15) working on gun-metal pivots so as to have a free

Fig. 15.

movement in any direction, and only one movement with each change of wind. It is rather a novelty, and has something to recommend it—as far, that is to say, as cowls can be depended on at all.

Messrs. O'Brien Thomas & Co. exhibit their sliding door hangers, by which sliding doors for warehouse parallel folding partitions are hung to roller and ball-bearing carriers, the bottom of the door working in a metal guide-

groove but not bearing on it, the weight being entirely hung from the rollers.

The Opalite Glazed Brick and Tile Syndicate exhibit their opalite tiling (with patent granulated back) for tiling wall surfaces. There are two or three exhibits of work of this class, which, under different names, do not seem to differ very materially in their nature. There is that of the Newellite Glass Tile Co., which claims to be a perfect wall lining in thin glass tiles with a backing which has a certain amount of elasticity in order to prevent cracking of the tile surface. Then there are the Crystalline Company's patent glass tiles. We are not very much attracted by the appearance of any of these wall-coverings, but they have their value, no doubt, from their being so thin and light and not materially increasing the thickness of a partition. Of a similar class is the work exhibited by the Marmart Co., as a material for shop facias, pilasters, &c.; this, however, is a rather thicker facing material (about ¾ in.), and is susceptible of producing five tones of colour, but the decorative work shown at the stall is very commonplace as such.

Messrs. Bennett Lawes & Co. show the application in construction of their "Gypo" fire-resisting plaster and cement, on lathwork, corrugated sheet iron, and constructional ironwork, fixed without the aid of a key. We do not know its composition, but it seems to answer its purpose well. A more important exhibit of similar class is that of the Granite Silicon Co., of partitions erected in their granite silicon plaster, which is made from ground and powdered alabaster, and appears to be a most firm and durable material, possessing high fire-resisting qualities and being an excellent non-conductor of heat. Solid partitions made on the principle advocated by this firm consist of a core of metal lathing held in position by an adjustable timber strut between floor and ceiling; the plaster is then applied to the thickness of about 1 in., and after it has set, the struts can be removed. A second coat of plaster is then applied on the other side of the lathing and when set, the final coat is applied on both sides, making the total thickness 2 in.

The patent loop wall-ties of the Warrington Bond Iron Syndicate, which are exhibited at their stand, form an excellent and scientifically designed metal wall tie for use where hollow walls are used—a form of construction, in our opinion, to be avoided as far as possible.

Mr. F. A. Fawkes, of Chelmsford, has a good show of woodwork, wood mantels, panelling, &c.

The "Emdeca" Metal Decoration is another of the forms of thin wall facing, in this case of metal—stamped ornamental ceilings, &c., a form, one may say, of machine-made *repoussé* work. The pieces in the form and size of wall-tiles are not sufficiently rigid for use in that manner; the material is at its best in large sheets.

Messrs. Mellowes & Co. exhibit their well-know "Eclipse" glazing system, of which the section is shown in fig. 16.

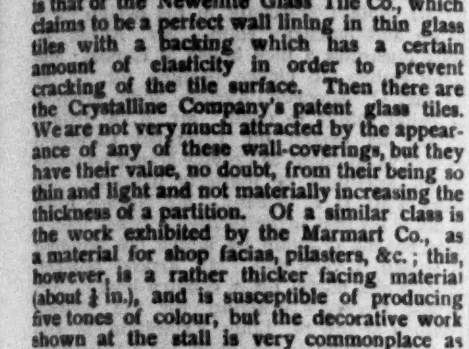

Fig. 16.

Messrs. D. Anderson & Co. exhibit the construction of their patent wooden lattice-girder felted roofs. We give an illustration showing what is the general character of this construction, in which light wooden lattice girders are employed with roofing felt as a covering. The felt is their Stonifex roofing felt, which, it is claimed, with one coat of mastic will last several years without attention. The roof thus constructed appears an admirable form of covering for large sheds for machinery or stores. The same firm also show silicate cotton as applied for fire-proofing and sound-proofing buildings, for insulating cold stores, and for covering boilers and pipes.

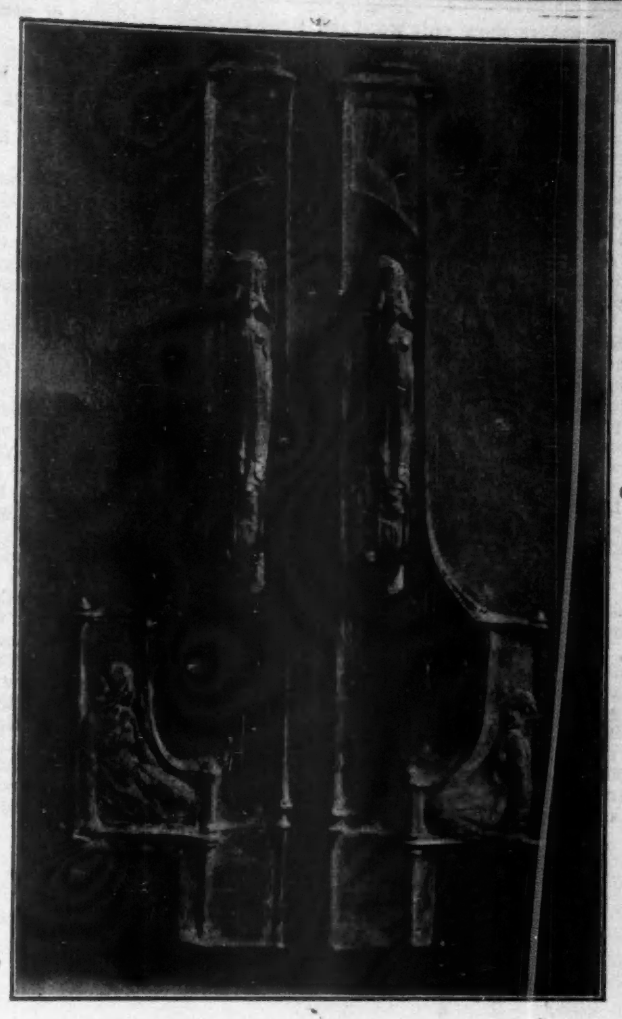

Fig. 17. [*See next page.*

Mr. Walter Notcutt, who is the British representative for the "Bommer" spring hinges, shows a large exhibit. The springs are enclosed in a small tube at each side of the door, fixed in the same position as ordinary butt hinges, and it is said with equal ease; by an easily made adjustment the screws can be wound up or let down to a higher or lower tension as required. Every variety of finish is shown in the specimens of all sizes that are exhibited.

The British Compo-Board Co. give an exhibit of their material as used structurally and as a lining material. Compo-board has been noticed before in our columns as an excellent and strong lining material for walls and ceilings, and capable of being very quickly fixed.

The Crittall Manufacturing Co. have an admirable exhibit, containing steel and gun-metal casements, their patent safety reversible casement for cleaning, and opening gearing for lanterns and fanlights, the latter excellent for combined simplicity and strength.

The Venesta wall panels, exhibited by "Venesta, Ltd.," are something of the same nature as compo-board, only made in a different way. It consists of thin slips of wood, three together, the middle having the grain the contrary way to the outer ones; and though only about half the thickness of compo-board, is very strong as well as light.

Messrs. Samuel Elliot & Sons, of Caversham, have a fine exhibit of high-class joinery, and show steam-struck mouldings from ⅛ in. to 20 in. width. A Spanish mahogany door, with inlay of satinwood, made some time ago and lent for exhibition, is a quite exceptional piece of joinery work. They also show their "Simplex Weather Bar" for casements, a simple but scientifically designed section which we think we have before mentioned, and which ought to be an efficient safeguard against wet.

The Rhodes Patent Sash-hanging Co. exhibit sashes hung with their steel chains and teeth pulleys, more expensive of course than cord, but possibly economical in the long run; at any rate they act admirably.

The Moore's Patents Co. have a very interesting exhibit. They have a sash window with a cord at one side only, the other side being taken by rollers; a sash which on being pulled down becomes a casement, opening inwards on a pivot for cleaning. There is a casement window which, while ordinarily opening as usual, can by a handle at its heel, so to speak, and a sliding slot, be pulled round so as to open partially across the frame, leaving a space to get at the outside for cleaning. The "liquid check" doorsprings for closing doors, and which can be simply fixed to the floor without any sinking, seem to be perfect in their action, as far as one can judge from the specimens erected at the exhibition; the check is made by means of oil forced through a small opening, which can be varied by turning a screw, so as to offer a greater or less resistance to closing. The most ingenious part of it is perhaps the manner in which the hinge is contrived so as to keep the door standing open if it is flung open sharply for any special purpose, while with a gentle and more gradual opening the closing force operates.

Palmer's Travelling Cradle is exhibited, and also (in the gallery) Coppard's Patent Swing Scaffold; both of which have been mentioned with recommendation in our pages.

In the gallery also is to be seen the Johns' patent safety window exhibited by "Incorporations, Ltd.," in which the sashes, sliding up and down in the usual manner, also revolve, for cleaning purposes, on a strong safety pivot. A feature in this window is the introduction of a hit-or-miss ventilator in the sash-frame itself, above the glass, so that a certain degree of ventilation can be obtained with the window closed.

DECORATIVE WORK.

The decorative side of the Exhibition is not extensive, only a few among the many firms who are manufacturing decorative articles for building purposes exhibiting. Messrs. Bratt, Colbran, & Co., of Mortimer-street, W., patentees of the "heaped" and "valley" fires, have a stall showing these patents with the fires in action. The virtue is in the simplicity of the patent, which saves both coal and labour and is capable of giving great or little heat as required. Amongst much that is vulgar or merely novel in the design of patent fireplaces

nowadays, these makers show only wood and iron mantels to their interiors of markedly excellent design; without being copied from old patterns they exhibit the refinement of detail that make the old so delightful. Messrs. George Wragge, Ltd., within a nicely designed showroom, have much that is of real interest, both on artistic and useful grounds. Thoroughly good in appearance and construction are the iron casement windows. Leaded lights are treated with wide leads in a substantial manner, and where colour or drawing is introduced, the leaded line is allowed its proper prominence as a factor in the design. In smaller fittings, such as finger-plates and electric-lamps, much beautiful figure modelling and enamel work is shown; the lines upon which these are designed are hardly perhaps sufficiently severe and architectural, but they are probably none the less popular for that. Interesting examples of lead work, both cast and wrought, in rainwater heads, gutters, and down-pipes, are above the average merit in design. Leadwork occupies an important position amongst decorative materials, and its use is not sufficiently appreciated either by the public or the majority of manufacturers. Fig. 17 illustrates one of their exhibits.

Mr. W. Höfler has a disappointing collection from his generally interesting showroom in Soho-square, Mr. Dressler's tiles, some very good oak panelling, and metal electric fittings relieving his stall from dulness. Messrs. Ashton & Green show some good mantels and interiors among their more utilitarian exhibits. A design of some originality for a lifting fire has been made by the Coalbrookdale Co., who exhibit nothing else this year. Messrs. Carter & Co., Encaustic Tile Works, Poole, show some extremely good tiles of unusual colours and design.

In the gallery Messrs. Waltham & Co. have a good exhibit of wrought metal for churches, electric light fittings, &c.; among the articles shown is a very artistic font in metal work, which we have seen before at the Arts and Crafts Exhibition.

Regarding terra-cotta and ornamental brick-work as decorative materials, it is astonishing how little attention is given to their appearance. Apparently it does not pay the manufacturer to appeal to other instincts than those of the jerry builder and villa speculator, for after careful search among the number of exhibitors who all show specimens of most excellent material and workmanship, there is not a single exhibit with a claim to any artistic feeling or design.

A new feature of the Exhibition is a fairly representative loan collection of architects' drawings. Mr. Mountford's New Sessions House, Old Bailey, is shown by the beautiful elevation of Mr. English and boldly-drawn interiors of Mr. Adshead. Mr. Florence shows his design for this also. A large photograph illustrates Mr. Mountford's Sheffield Municipal Buildings from a new point of view. Of a large number of buildings by Mr. H. B. Measures here represented the plans and sections of the Birmingham Rowton Houses is of the most interest. Mr. Statham sends an elevation and details of the new front to the *Builder* office, and a perspective study in bridge design. Mr. Ernest Newton shows perspective drawings of several country houses and a colour drawing of his delightful front for Martin's Bank at Chislehurst, which does not make it out nearly so good as it is. Of smaller domestic work that of Mr. W. H. Ward, illustrated by photographs, is very good indeed, work distinguished by those refinements which it is next to impossible to show adequately in a drawing. Some small houses of a different class, by Mr. H. G. Ibberson, show a pleasing individuality of style if a little exuberant. A corner village site is well treated by Mr. Robert Marchant in his design for a house and butcher's shop. Mr. Alfred H. Hart illustrates a nice house at Enfield; and some rather too clever designs for houses by Mr. O. Maxwell Ayrton give promise of better things to come. Mr. R. A. Briggs shows his design for Liverpool Cathedral as well as additions to Cowley Manor by water colour drawings of masterly handling, the work of Mr. H. F. Waring. Mr. Horace Field is not at his best in the Granville Hotel, Ramsgate, but the drawing by which the building is shown is very bad. Mr. Arnold Mitchell sends a nice model for a country house. Mr. Ernest George's drawing for the British Pavilion at the St. Louis Exhibition is also here, apparently based upon Sir Christopher Wren's orangery in Kensington Gardens, a better model than which it would be hard to find.

A good many drawings of old buildings are also sent, noticeable amongst which are Mr. F. L. Emmanuel's pencil drawings, showing a wonderful feeling for tone and texture. Quite as remarkable, but in a different way, are Mr. Fulleylove's pencil studies of Jerusalem. Mr. C. J. Lauder exhibits a number of water-colour drawings of Venice which ought to be seen, that of the now fallen Campanile of St. Mark's from the Grand Canal, with St. Mark's on the right, being particularly interesting.

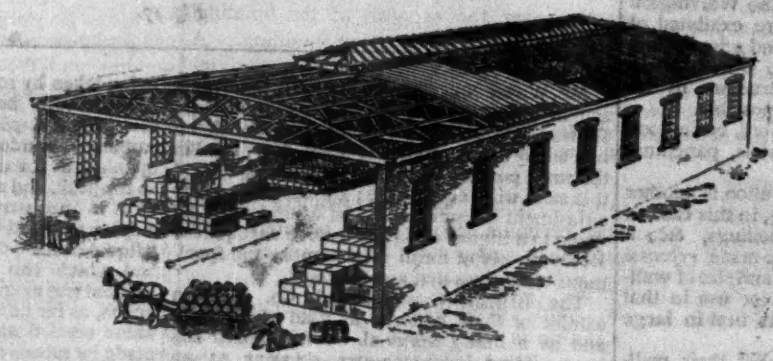

Illustration of Anderson & Sons' Roofing System.

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